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Transcending post-truth: Open educational practices in the information age

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ABSTRACT

This paper discusses operationalization of open educational practices (OEP) using innovative, Internet-influenced pedagogies to expose dangers of post-truth narratives. The first part reviews interpretations of OEP (associated with open-access and tools, collaboration, problem-centered learning, and democratic pedagogy) and explores possibilities for creating educational initiatives where students learn to create problem-solving communities mirroring an informationally healthy society. The second part suggests our society has reached a post-truth crossroads. Post-truth was initially discussed in the 1990s—a reification of critical theorists' pessimism of social structures, controlling narratives and ways members react to critical events, whether through obedience to institutional authority or support for destructive adventurism, creating situations producing cybernetic double binds. The third part contextualizes OEP as ecologically grounded pedagogies through an open source educational processes framework focusing on productive many-to-many online communication and community formation, offering practical examples of open source educational processes curricula implemented in a higher education setting.

Introduction

We are struggling, and will continue to struggle, with the sometimes positive, sometimes negative, and often surprising consequences of a rapidly evolving information age. We are faced with new human capabilities related to accessibility and connectivity we barely recognize, let alone understand how to implement in daily life. How we not only learn from but learn to use a continuous stream of social tools will play an increasingly critical role in our individual and shared futures. Current literature shows the word "open" has multiple meanings when used to describe (especially distance) educational practices over the last half-century (Naidu, 2016). One constant meaning

of open is reaching beyond traditional boundaries, granting students autonomy, so they are not hampered by (what have been) traditional boundaries in teaching and learning (Glassman, 2016). Physical distance is an obvious boundary in distance education (Tait, 1994). Perhaps more important are boundaries created through cultural-historical circumstance, by socially sanctioned (e.g., news outlets with well-defined agendas) and unsanctioned (e.g., conspiracy theory forums) information streams affecting how individuals and groups interpret and act on emergent social phenomena (e.g., the COVID-19 pandemic). Education is an area impacted by these blurred boundaries. In educational settings, students are often pushed, even pressured to follow socially prescribed guidelines (e.g., predetermined hierarchies) and information sources (textbooks, assigned articles, and resources) to be successful. Not following these guidelines may lead learning to be considered illegitimate (Tilak, 2023). This can leave learners unprepared for life in unstructured information ecologies where heightened agency can lead to increasingly complicated outcomes (for individuals and society). This does not mean community and/or societally defined boundaries are solely deleterious for social groups; they can offer stability and maintain focused, productive activity. However, enforced stability of maladaptive systems can sometimes be more destructive than chaos (Guddemi, 2020).

Information systems (formal and informal) supporting maladaptive institutional communication patterns can exacerbate social problems. They can also vitiate agency for change (Dewey, 1916). Open information societies offer opportunities to move beyond institutional boundaries supporting broken systems. Broken systems are sometimes characterized by promulgation of what have been called "post-truths." Information challenging accepted truths can, however, also push individuals to question belief systems central to community coherence (Harrison & Luckett, 2019).

In this paper, we echo open educational practices (OEP), arguing openness is dependent on infrastructure (resource pools, Internet-influenced problem-solving communities mirroring everyday informal activities) and processes teaching individuals how to be active agents in ever-expanding information landscapes (Koseoglu & Bozkurt, 2018). Through integration of both formal and informal distributed technologies (Chiappe & Lee, 2017), OEP can provide contexts for individuals to learn to reach out and find information beyond traditional social boundaries, including formal classrooms. They can also teach individuals how to shield themselves and their social group from predatory information common in cyberspace.

The Internet and OEP

The paradox of the Internet is that it simultaneously heightens human ability to create and control destinies through searching and creating new knowledge while amplifying nihilistic societal tendencies to be trapped by falsehoods and dysfunctional social relationships (Tilak & Glassman, 2020). Exploring pathways unimpeded by dominant institutional support systems while avoiding predatory groups are high-value skills in the 21st century. Such agency can help provide insulation from echo-chamber communities immune to critical interrogation. Echo chambers often pose questionable truths masquerading as knowledge creation (Lapsley & Chaloner, 2020; Rheingold, 2000),

forming what education-oriented scholars have called "post-truth" contexts (Barzilai & Chinn, 2020). To navigate the post-truths and perils they bring (relating to phenomena like vaccine wars, arguments about climate change), onus often lies on the user to critically vet information. Distributed information technologies can allow users to extend beyond their own and dominant knowledge repertoires in broken communities to seek new perspectives and understand the ramifications of their ideologies. There is value in developing advanced OEP infrastructure as dynamic learning contexts where sources have competing and often opaque agendas, but users must possess the skills for critical online navigation. The abilities to effectively recognize and respond and adapt to demands of increasingly open, nonhierarchal, nonlinear problem-solving environments at individual and local community levels are becoming imperative for well-functioning societies, as accepted social truths turn into post-truths.

Increasing responsibilities to "figure out" truth

Accepted truths can bind social groups together. A fear that functioning social groups have is that their core truths cease to be realized by members. Institutions (government, media, academia) are often specifically designed to maintain and communicate accepted truths in ways circumventing direct challenge. Social psychologist Kurt Lewin (1943/2014) suggested societies create a class of gatekeepers maintaining control over information flows and defining the validity of truths and social processes. The Internet provides, for perhaps the first time, powerful tools for a new individual agency, including exploration of alternatives to institutional truth (Tilak & Glassman, 2020). We must consider whether new abilities to pursue alternative truths are destructive or beneficial. While some have argued transcending societal boundaries can create chaos (Barzilai & Chinn, 2020), others have suggested institutions are as or more invested in creating (sometimes inescapable) post-truth narratives protecting their agendas (Teisch, 1992).

The Internet will continue to create wider avenues for challenging accepted truths (good or bad). Users will need to critically explore these challenges, gauging when to dismiss alternative truths and when to deeply explore possibilities. Individuals are being given the choice to trade being dominated by maladaptive information systems for the chance to face potential instabilities emerging from challenges posed to institutional truths. It is important to understand both benefits and social consequences of this looming choice. OEP offer opportunities to make this choice between institutionally promoted and individually determined truths more transparent and provide positive pathways for exploring new relationships with information. But, this is best accomplished through infrastructure for support and teaching processes augmenting efficacy for adaptive online exploration.

This three-part paper focuses on one trajectory of OEP: innovative, process-oriented pedagogical models empowering learners as coproducers on lifelong learning paths (Andrade et al., 2011). We suggest this idea of openness shows similarities (in a domain-general sense) with the development of open source programming communities during the dawn of the information revolution (Glassman & Kang, 2016), that were adept at knowledge creation through informal online communication.

Developing educational curricula integrating process-oriented lifelong learning activities that emerged through the open source movement can help individuals learn to respond to emerging issues as a matter of course. These types of activity can allow individuals to navigate social phenomena without the need for extensive decision-making about them (i.e., habitus; Bourdieu, 1977), including situations arising from post-truth narratives supported by self-interested institutions (e.g., media, government).

This first part of this paper reviews literature describing interpretations of OEP: a set of emergent electronic tools and practices enabling community orientations; active, constructive learning (broadly defined); and open access to resources and technologies (Koseoglu & Bozkurt, 2018). While scholars have stressed using open tools to design OEP, we extend this idea by highlighting the importance of the transfer of agency and efficacy between formal learning and informal online environments, allowing development of 21st century informational capital (Prieur & Savage, 2013). The second part explains how Internet tools can enable the development of post-truth narratives through information manipulation and also offer pathways to escape them. Post-truths can be dangerous, creating contexts where individuals tend to accept social narratives even while recognizing them as questionable. OEP offer possibilities in creating educational scenarios where individuals learn to escape pathological learning. The third part provides a thesis for OEP in the 21st century to create Internet-influenced learning scenarios using an open source educational processes (OSEP) framework, stretching the fabric of historically situated social groups through norm-driven educational spaces.

The paper focuses on how post-truth narratives are a danger to the development and sustainability of cohesive, productive societies. This has been a growing topic of concern in educational literature (Barzilai & Chinn, 2020; Lapsley & Chaloner, 2020). Post-truth contexts are also dangerous for individuals, creating double binds (Bateson, 1972) leading to maladaptive learning. Some have suggested this is an Internet and social media phenomenon (Barzilai & Chinn, 2020). We argue this is just part of the argument. The Internet, if used productively, can help us escape, perhaps for the first time, several traps critics claim it creates. Echoing Dewey (1949) and his warnings that adaptation to technologies of the industrial age could be facilitated through new types of education, we argue we control our own informational destiny through the ways we redefine teaching and learning in the classroom. Perhaps the only way to embrace the information age to the benefit of humanity is through a framework like OEP, integrating them into everyday formal and informal learning environments.

Part I: Interpretations of OEP

OEP fall under the broader movement of ensuring open information resources and resource pools, ongoing conversations, and constructive learning through Internet-based technologies. The ethos of contemporary OEP shows important similarities with the Free Liberte Open Source Software movement (FLOSS) (see Robles et al., 2014) and shares basic goals with the open education initiatives of the 1960s and 1970s. FLOSS was an outgrowth of developing online resource communities where programmers

served engaged in open-ended, nonhierarchical knowledge building unrestricted by business hierarchies (Glassman, 2016). Open education emerged to deliver educational resources as ways of reaching beyond traditional barriers (e.g., distance, time, cost); expanding access across social categories (e.g., rural students could have similar opportunities as urban students).

In the 2000s, some universities (initially Massachusetts Institute of Technology; others followed) recognized the possibilities of establishing websites mirroring traditional, pre-Internet education, housed within institutional boundaries (Glassman, 2016). These initiatives culminated in extended massive open online courses (xMOOCs) with hierarchical (top-down) education styles (Bozkurt & Keefer, 2018). The original term *MOOC* is jointly attributed to Dave Cormier and Bryan Alexander (Open University, 2023) and based on connectivist approaches. Early MOOCs emerged from studies (Downes, 2007; Siemens, 2007) offering courses to university students and learners unaffiliated with higher education institutions, and had strong similarities to FLOSS. Educational initiatives kickstarted by universities to monetize MOOCs and create satellite campuses downplayed the similarities of the coming education revolution with FLOSS and open source communities (Downes, another originator of the MOOC concept, referred back to FLOSS in his 2018 blogposts).

Early definitions of OEP stem from the Open e-Learning Content Observatory Services project (Cronin & McLaren, 2018), under the European e-learning program, looking toward delivering downloadable, web-accessible open educational resources (OER) in student-centered ways. The Open e-Learning Content Observatory Services project offered learning alternatives to traditional one-way channel learning activities dependent on expert-driven content provision. Widespread operationalization of hypertext shifted teaching and learning equations, offering individual instructors and students the opportunity to cocreate educational practices. We argue these changes influenced meanings of OEP, even as the developing infrastructure struggled against traditional education processes (e.g., students were often uncomfortable with cocreation, instructors feared losing control of content; Glassman et al., 2011). Institutions such as the Open Educational Quality Initiative (OPAL) began to use new technologies to facilitate learner and instructor empowerment based on conversational feedback loops. For example, OER moved from closed but accessible sites created by experts with downloadable information, to open, dynamic online resource pools built iteratively by practitioners.

An early OPAL report suggested practitioners and students needed support in operationalizing emerging information technologies and developing collaborative skills (Andrade et al., 2011). However, the same institutions implementing the new pedagogical infrastructures were being challenged by a more "open" information universe (Glassman, 2016), producing emerging conflicts between the need to deliver (and test) specific content and the importance of establishing grassroots-level learning communities. Scholars have tried to develop a workable definition of "openness" pertaining to disseminating educational resources. This attempt is contextualized by continuing struggles between the primacy of creating individual projects through varied accessible resources (e.g., the initial OER framework) and shared community resources to adapt to users' local needs (Downes, 2004).

The potentials of networked scholarship have been discussed before (Licklider, 1960; Siemens, 2007); OEP looks to extend these ideas, suggesting ecologically grounded pedagogies mirroring the everyday Internet experience. Especially important is the efficacy of users in creating communities with high social network capital (ability to connect with others) and knowledge capital (ability to seek new ideas) through active pursuit of responsible networked relationships facilitating problem-solving (Rheingold, 2000). Learning goals salient to today's information-saturated society go beyond current notions of "digital literacy" (which usually focuses on immediate, individual psychic and behavioral outcomes from tool usership). Ideas that can be incorporated into classrooms (Mays, 2017) include:

- what to teach, how, and when
- how to assess learning
- how curricula are sourced and operationalized.

Rehashing traditional educational activities in online spaces (e.g., using search engines to draft a paper on an assigned topic; or fusing a learning management system with Twitter and assigning weekly blogposts) offers limited opportunities for, let alone understandings of, learning in information-saturated social contexts (Tilak, 2023). We suggest using open source educational processes (OSEP) to create scenarios where individuals learn how to inhabit and navigate complex online ecologies.

Koseoglu and Bozkurt (2018) illustrated links between OER and teaching-learning practices to implement them. Applications of open practices are most apparent at a confluence of social media, shared access to knowledge and resources, and user ability to maintain and navigate open-source communities (Chiappe & Lee, 2017). Our review shows OEP have been considered as a pathway for addressing the challenges of scaling OER and expanding it as a "web of trails" (Bush, 1945, p.121) into larger information landscapes.

OEP should not focus on using specific platforms (dominant corporate technologies like a learning management system, Facebook, and Instagram might be counterproductive; Tilak & Glassman, 2020) but on developing experience and efficacy in sustaining positive online communities and designing activities promoting exploration. It is important for learners to extend thinking beyond boundaries of authoritative information systems and reinterpret ideas in ways relevant to their individual and collective experiences.

Part II: Post-truth, double binds, and OEP

The idea of living in a society where information is becoming difficult to navigate, and meaning and truth are increasingly flexible (e.g., the need to balance multiple perspectives and sources) is gaining traction in formal education. Evolving information technologies allow us to challenge our understandings of the world in productive and destructive ways. Warnings of ubiquitous, unfiltered information leading to post-truth beliefs guiding behaviors (Barzilai & Chinn, 2020) are (thought to be) increasing as individuals become active agents in choosing alternative accepted "facts" from varied

possibilities. The onus for determining validity and applicability of information is often placed on individuals and their ability to logically grapple with competing claims. Some place the development of individual competencies within an epistemic cognition framework (Chinn et al., 2014). It is probably no accident that ideas of post-truth, and the need to develop curricula spurring development through individual epistemic cognition, along with perceptions of detrimental possibilities of distributed information systems have gained resonance in education-related fields simultaneously. Here, we make three points:

- Relationships between post-truth and evolution of Internet applications as part of daily life are more complex than portrayed. Distributed information systems are a partial cause of spreading mis- and disinformation but can alleviate the consequences of its spread, especially in producing maladaptive narratives. Whether the Internet forms a cause or cure depends partly on how societies integrate OEP into formal and informal learning. Education, as opposed to control of the Internet by government or corporate entities (Tilak & Glassman, 2020), is central to overcoming real and potential problems.

It is a mistake to consider the roles of scientific verification from primarily individually rooted perspectives. In dealing with post-truths based in alternative facts, it is important to recognize the role(s) online ecologies less restricted by institutional boundaries play in human thinking. While we do not deny the benefits of educating individual students in traditional scientific thinking, we are moving from an era of hierarchical, expert-driven learning to one of many-to-many communications. A recent example is the use of TikTok for a new type of evolving educational seminar on the dangers of drilling projects in Alaska (Willow project) viewed by over 54 million people (Murray, 2023). The seminar resisted governmental information distribution justifying decision-making. Going by such developments, we suggest the focus of education needs to pivot towards how to productively think with rather than about society.

- We must move from analytic, goal-directed models of certain "truth" toward Dewey's (1941) warranted assertibility. We should not look at the Internet as creating conflict between "truth" and post-truth,—this is a false dichotomy. We should see adaptively norm-driven cybernetic spaces as ways to negotiate truth for adaptive societal consequences in the current historical context.

This framework suggests it is important to treat Internet tools as building natural pathways from institutional expertise toward dynamic mutual understandings of the world combining history, the social moment, and the emotional needs of individuals and communities. The following sections explain how post-truth and possible solutions can be explained by applying Bateson's (1972) ideas on learning based on maladaptive feedback loops and how we might avoid them by educating for an evolving information age.

Truth, post-truth, and OEP

While post-truth has recently become a hot topic in education, it was first discussed pre-Internet, in terms of the spread of dis- and misinformation by authoritative power structures (Teisch, 1992). Teisch suggested simplified narratives developed by (governing and business) institutions and promoted by gatekeepers were often used for covering up controversial phenomena. In a recent report arguing for education steeped in "digital literacy," Osborne and Pimentel (2022) wrote, "Thirty years ago, information sources were more regulated. Information was typically filtered by 'gatekeepers' in the news media." Except, 30 years ago, most people did not believe climate change was a major problem; 20 years ago, many Americans believed Iraqis flew planes on 9/11, and that there were weapons of mass destruction in Iraq (Braut-Hegghammer, 2020). Gatekeepers who provided evidence for these claims were part of socially filtered learning systems, making it difficult to challenge espoused "truths." The difference between post-truth and recognition (even intuitively) of claims with greater warranted assertibility created what Bateson (1972) called a "double bind" for many citizens.

The idea of double bind was developed by Bateson et al. (1962) to understand how complementary, maladaptive feedback loops lead to pathogenic learning. To put this in the context of post-truths, media and government institutions proposed there were weapons of mass destruction in Iraq. There was information from international weapons inspectors that they could not find such weapons (ironically mostly available to those with Internet connections). People who chose other information over dominant narratives feared being marginalized. Learning feedback loops involving weapons of mass destruction became pathogenic (Braut-Hegghammer, 2020) as people who promoted the idea were given megaphones, while others pointing to conflictual findings were silenced.

Concerns about misinformation (involving issues like masking virus origin and vaccinations) peaked during COVID-19. This was one of the first times institutional narratives clashed with distributed information systems on equal footing. Individuals increasingly relied on public platforms and applications for finding accessible, viable information while maintaining social distance (e.g., the carefully curated r/Coronavirus often supported up-to-date information on masking and personal safety, sometimes conflicting with government and media institutions; Lai et al., 2020). Other alternative sources displayed destructive tendencies (e.g., individuals mistrusted vetted information on vaccines—online anti-vaxxer communities took advantage, consequently developing suspicious information pools on less well-moderated sites like Telegram). Once informational feedback loops become maladaptive, either from institutions or online, there is no way for individuals to escape pathological devolutions in learning. According to Bateson (1972), the only solution to these maladaptive feedback loops is a dramatic shift in learner perspective akin to apotheosis or transcendence.

Once individuals heard and believed a vice president state Iraqis were looking to obtain resources to make nuclear weapons on the institutionally supported show "Meet The Press" (a defined gatekeeper) in 2002 (Kucinich, 2007), they would continue to obtain information about weapons of mass destruction through similar sources (most lacked accessible alternatives) and learn of immanent dangers without questioning arguments (the secretary of state of the United States of America holding up a

vial at the United Nations and using it as proof of chemical weapons programs; Roberts, 2021). In a more recent online example, once individuals "learned" vaccines were dangerous, they continued seeking sources corroborating their thinking, such as forwarded social media reports of deaths after taking the COVID-19 vaccine. There were more available information alternatives related to efficacy of vaccines, but also greater commitment to the learning trajectory as it was a product of individuals' cultural histories (Vygotsky, 1931) and political biases.

A proposed solution to search and Internet activity buoyed by recommendations (which can be biased and feed on social histories of users) includes conscious recognition of joint social corroboration of newly emerging meanings based on (real or perceived) social ramifications rather than single information sources (Duschl, 2020). We do not deny there are perils in distributed Internet ecologies tapping into specific social histories binding individuals and groups to pathological learning trajectories (echo chambers creating insulated narratives that cannot be challenged; Lapsley & Chaloner, 2020). However, distributed information systems can also offer opportunities for liberation from manipulative institutional and/or online narratives and accompanying pathologies affecting adaptive group functioning (something institutions often cannot and will not do).

Finding viable alternative narratives in a sea of alternatives

Critical online exploration can be emotionally and cognitively taxing and requires positive experiences when using the Internet as a source of learning. Immediate attributions correlating with post-truth based in operationalizing social media (Barzilai & Chinn, 2020) may form just part of the argument explaining conflicts between warranted assertibility and destructive post-truth narratives. Different platforms have their purposes in varied contexts, driven by user intention and history (e.g., Telegram, which has been used to promote conspiracy theories about vaccinations in the West, also provides an outlet for challenging authoritarian governance in the context of the Russia-Ukraine conflict; Nazaruk, 2022). Cultivating user efficacy in recreating knowledge by exploring varied online sources is necessary for equipping the populace with informational capital in an age of mis- and disinformation. If users cannot recognize the adaptive potentials of information technologies, they might easily become trapped by post-truth ideologies based in maladaptive learning histories priming them to accept information with low levels of warranted assertibility as valid, guided by desire to be part of some in-group, and/or personal biases (Rathje et al., 2021).

OEP can promote balanced information searching and community vetting as important aspects of education in the 21st century through engagement with collaborative tools (Koseoglu & Bozkurt, 2018). Mirroring everyday online activities in educational settings while expanding access to those situated outside educational institutions can help individuals use information technologies to transcend double binds, even those embedded in users' social histories, in responsible ways.

It is incumbent upon healthy social systems to educate members in not only using new technologies (digital literacies) and thinking through competing sources (epistemic cognition) but also in navigating and creating productive learning in complex

information landscapes. The adoption of OEP at global, societal, and local levels (inter-mingled in using information technologies) (Cronin & MacLaren, 2018) offers possibilities for developing deeper understandings of what it means to learn in the face of unexpected problem sets (Glassman, 2016). In the next section, we describe possibilities for operationalizing OEP in formal education and cultivating Internet use as an exercise in distributed knowledge creation, using principles of OSEP.

Part III: Extending OEP through OSEP

Dangers inherent in post-truth narratives, whether sourced to institutions or transient online communities, highlight the importance of (re)creating online communications capable of transcending maladaptive (pathogenic) learning trajectories. To this point, emphasis in adjusting to open information ecologies has been laid on individuals' abilities to think through issues to avoid epistemic traps. We consider pathogenic learning as a systems-level threat to productive social engagement. The solution lies in creating a larger populace capable of using information tools to challenge accepted narratives while being aware of shared communicative responsibilities in developing and sustaining alternatives to avoid simply moving from one web of pathogenic learning to another.

Interconnections created by Internet tools afford new types of exploration, but these must be tempered with realization that information is purposeful for those developing and disseminating it. Purposes are not immediately transparent or uniform. It is critical to understand, and be part of relationships proposing, building, and authenticating narratives. OEP can help individuals realize possibilities of the information age through innovative pedagogies mixing collaborative learning, open access to scientific data, and social media (Chiappe & Lee, 2017). We explicitly outline how to create contexts offering these possibilities, using principles of OSEP (Glassman, 2016).

Characteristics of OSEP

Open source does not (only) mean readily downloadable tools and resources (e.g., articles, graphics, source code). Very often, processes used to create and modify free (per FLOSS, this does not mean free beer, which always has some ties and/or costs) artefacts are limited by institutional boundaries and proprietary concerns (Glassman, 2016). Issues related to gatekeeping and transparency of techniques in creating original products distinguish free and open source. With free resources that cannot be modified (e.g., code for a conversational assistant), benefits accrue to individuals if they rely on a centralized information source (determined by institutions creating tools). An open source ethos allows the forming of a community to benefit from collective problem-solving to create multiple iterations of prototyped ideas. However, even when given opportunities to engage in nonhierarchical knowledge building and organic moderation similar to early open source communities like Linux, students are often uncomfortable based on previous educational experiences and histories (Tilak & Glassman, 2020). Completely escaping the boundaries of teacher-assigned sources to bring in one's own perspectives is also sometimes frowned upon in traditional classrooms, with task completion often requiring reliance on defined texts and argumentation trajectories.

Informational capital as cultural capital

Prieur and Savage ([2013](#)) suggested knowledge and use of the arts (music) and style (specific dress codes) are representative of Bourdieu's cultural capital, or funds necessary for social advancement, in the 19th and 20th centuries. Socially vetted knowledge (e.g., advanced degrees in science or humanities) is more representative of cultural capital in the late 20th and early 21st centuries. The ability to find information and successfully use technologies to solve difficult problems will necessitate a new cultural capital as we move deeper into the 21st century. Prieur and Savage labeled this cultural capital as "informational capital."

A common factor of Bourdieu's cultural capital is that knowledge leading individuals to create habits (habitus) of success is transmitted primarily through educational institutions (e.g., going to the right schools, enhancing knowledge of how to dress for business meetings). Informational capital offers opportunities for challenging double binds created by institutional narratives and overcoming traditional resource-driven funds of social coexistence, or cultural capital. The quick takeover of informational capital as a dividing point has created almost humorous rushes to knowledge, such as when ChatGPT was publicized and financial and academic elites immediately declared knowledge of not only its meaning but what it would mean for society, in herd-like fashion. A desire to display informational capital can be destructive as the speed of technological innovation (Glassman, [2016](#)) can eclipse time and experience users need to understand their meanings in society.

The Internet can open doors for social systems to be recreated through communicative learning systems less dependent on material resources (there are still divides, but informational capital is less restricted by social barriers). OEP offer opportunities for a healthier egalitarian society along two converging lines: testing institutional privilege in promulgating narratives, and challenging individual elitism by offering expansive opportunities for informational capital.

The OSEP learning model

OSEP are based in nonhierarchical (and when possible) nonlinear learning networks (aligning with Dewey's ([1916](#)) democratic education), along with open-source communities (emblematic of early efforts like Linux; Glassman, [2016](#)). They are an extension of OEP in that they incorporate social media and other communication tools, shared access to knowledge and resources, and user abilities to develop, maintain, and navigate open-source communities (Chiappe & Lee, [2017](#)). OSEP specifically targets processes involving lifelong Internet-mediated learning, creating scenarios mirroring informal online activity as cyberspace continually evolves (Glassman, [2020](#)). Individual students and teachers collaborate as codesigners of online problem-solving communities and learn to remix knowledge while (in the best cases) self-managing social relationships. Examples of activities powering these relationships include creating explicit or implicit governance structures, understanding relationships between individual and collective exploration of new possibilities within system constraints to facilitate cohesive collaboration, collectively balancing additions or subtractions to ideas while creating and maintaining high levels of social capital. OSEP curricula look

to create a social (and educational) ethic for implementing OEP infrastructure, so users have agency in Internet exploration, following four general principles (Glassman, 2016):

- Ideas and information shared within the classroom can be used by each interlocutor for their own purposes. No other participant may control what another chooses to do with information.
- Students should be able to look at effectiveness of shared ideas in solving problems posed within the classroom. They should not copy previous iterations but augment them through critique.
- After making changes, each interlocutor should share information and ideas with every other interlocutor in the classroom.
- Every other student with whom ideas have been shared should be able to benefit by critiquing and building upon them.

In OSEP classrooms, each user is encouraged to engage in processes of reformulating and/or recreating tool-mediated activities, as joint stewards in problem-solving. Possible solutions to emergent problems can be considered simultaneously through many-to-many communications employing abductive reasoning, considering various possibilities side-by-side, and choosing the best possible solutions in the moment. To engage in abductive thinking, learners and instructors must work as a distributed community rather than in a centralized teacher-led one, and each member needs to perceive they can function with high collective efficacy (answering the questions: Can we do this? Will other community members support me? Am I a valuable agent? Glassman et al., 2021) to recreate ideas. Creating opportunities for positive open source experiences in local classrooms through aim-driven projects can foster informational capital through the evolution of dedicated knowledge systems. Students take on the ethos that members of the Apache or Linux community experimented with a half-century ago, but as part of everyday curricula, seeking solutions outside their immediate learning community based on abductive logic rather than personal bias. The OSEP framework highlights that the Internet is valuable as a 'web of trails' for thought, not an echo chamber.

Operationalizing OSEP curricula

While OSEP look to integrate the development of informational capital and abilities to move beyond dominant discourse in searching for new knowledge solutions, operationalizing such practices requires sustained effort from instructors, students, and educational systems. We suggest nascent steps for building these learning ecologies in formal contexts. Steps can (initially) be applied in a domain-general manner, since they adhere to Deweyan and cybernetic perspectives, treating formal education environments as ecologies of interacting tools and human agents. Topics and activities can be altered to facilitate similar collaboration. We illustrate these steps using examples from two iterations of a college class focusing on educational psychology

culminating in published projects coauthored by students and instructor (Tilak et al., 2022; Tilak et al., 2023).

Many students enter preservice teaching classes in an educational double bind. They are told class content is necessary for expertise in teaching. Simultaneously, ideas and concepts can seem separate from everyday practice (e.g., students believe motivation and constructivist theories make sense, but are not apparent in K-12 classrooms). This can lead to pathogenic activities where students learn simply for grades. The following steps to creating OSEP classrooms may challenge mythologies about what and how students are learning:

- **Step 1:** Identify joint intentions for classroom systems to guide purposeful problem-solving. For example, an educational psychology class for preservice teachers could focus on understanding theories of human development and applications to classrooms. Activities and projects emerge iteratively if instructor and students are patient and focused. Exploration of ideas beyond the syllabus should be linked to the overarching goal, but not be restricted by institutional boundaries. For example, in writing papers, preservice teaching students should not only explore ideas interesting to them from scholarly papers they find but express their viewpoints about applying theory practically to teaching and learning.
- **Step 2:** Create working groups to foster community. Groups can be maintained to allow development of strong bonds, or shuffled to facilitate many-to-many communications and heighten possibility to achieve maximum unique ties between peers and instructor. Randomization processes (counting off numbers) or party game scan be used, depending on class modality (distance, hybrid, or in-person). We have used games like musical chairs to create working groups of college students in in-person classes, allowing them to gravitate toward friends and familiars and use relationships as assets in learning.
- **Step 3:** Construct a mosaic of tools (depending on the class purpose; one-dimensionally choosing a tool without adaptation may not meet every classroom's needs) that can be used to operationalize activities. Discussion-based tools allowing higher interactivity (e.g., a dynamic Reddit "ask me anything" live chat; Tilak et al., 2023) may help students engage in meaningful conversations and cross-post ideas from other online subcommunities. Incorporating live streams or media screenings into discussions can help bring perspectives from popular culture, further helping students critically gauge what theories practically look like and discuss their own real-life experiences. Shows like *Ted Lasso* and *Abbott Elementary* are streaming titles providing examples of team-level collaboration in physical education and teacher professional development to students respectively (Tilak et al., 2023).
- **Step 4:** Design coauthored projects working groups can iteratively build. Adapt the classroom technological infrastructures to make changes feasible. For example, in our Fall class (Tilak et al., 2022), the intention to coauthor a book showcasing illustrations and scholarly perspectives detailing educational theory and practice emerged through collective voting following evaluation of student storyboards (illustrations of pedagogical practices) and papers. Students and instructor collaborated to adjust class schedules and set up a Microsoft Teams environment to

conduct weekly 20-minute coauthoring tasks for five lectures. The authored book could be used by in-service and preservice teachers to prepare for their careers and was referred to by the Spring students (Tilak et al., 2023) to supplement the textbook.

These are four steps to help construct environments where students learn concepts relevant to a syllabus and cross-pollinate ideas from popular culture and scholarly sources transcending the classroom (and teacher) (e.g., cross-posting on Reddit, exploring new theories and practices relating to classroom concepts, co-authoring openly available texts for others to rely on). We suggest innovative pedagogies can build relational learning ecologies allowing students to escape double binds in theories they learn, and observations in practice, through Internet navigation.

Conclusion

The Internet represents fields of unrealized potential and minefields of unanticipated dangers for individuals and societies. A very recent study in the journal *Nature* (Robertson et al., 2023) found individuals using search engines to find information are not passive recipients of algorithm-driven sources but actively engage in searching for information meeting their needs (cognitive and emotional). Polarization emerges from (sometimes maladjusted) user learning. Reflecting Dewey's (1949) insight about the industrial age that technologies do not control behaviors but humans control their informational destinies. Our primary tool in making sure new digital technologies work toward advancing humankind is education in the how and why of being a responsible digital learner citizen. The infrastructure we build and the educational initiatives we create to operationalize OEP will, we argue, guide new types of engagement and agency created through Internet applications.

One critical flashpoint in the struggle to create a knowledgeable, just society through the potentials of the Internet is the dominance of post-truth narratives guiding everyday behavior that may create double binds—and the residue of maladaptive learning they create. OEP offer avenues for realizing that post-truth narratives can be socially debilitating even as powerful interests (institutions, political movements) work to maintain them. The Internet transcends vetted gatekeepers, pushing post-truths and misinformation that serve as their lifeblood to the forefront. It is important to remember the post-truth narratives and double binds they create predate the Internet, with misinformation promoted by institutions more interested in protecting themselves than members of social groups. The Internet, while creating new pathways for misinformation, also provides options for challenging post-truth narratives and creating healthier alternatives.

In terms of designing productive information societies, we are at a crossroads; do we look to control online information flows, giving responsibilities to some of the same institutions benefiting from post-truth narratives? Or do we increase investment in and commitment to OEP? The latter would require extended resources, but we suggest the former could too easily lead to social pathologies in ways yet unimagined. Attempting to control information would recreate informational capital as cultural

capital, giving those regulating information flows increased prospects, creating new gatekeepers while losing opportunities to democratize cultural capital. Investing in OEP however, means recreating how we educate, blurring formal and informal education to help learners cultivate informational capital as part of lifelong adaptation to an unpredictable information age.

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