

# A Critical Metaphor Analysis of Educational Technology Research in the Social Studies

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This study employs Lakoff and Johnson's (1980, 1999) conception of metaphor as rooted in embodied experiences to investigate educational technology discourse in the social studies. The last 3 years of scholarship in the social studies section of the journal *Contemporary Issues in Technology and Teacher Education* is examined for the presence of metaphors used by authors to justify or support their arguments. Five prominent categories of metaphor were identified within the discourse: Manual labor metaphors, construction/building metaphors, mechanistic metaphors, technology as biological life/agent metaphors, and journey metaphors. While it is necessary to use metaphors to understand new phenomena such as digital technologies, results suggest that some of the specific metaphors that were commonly employed may impede a more thoughtful approach to conceptualizing and implementing new technologies. Results also indicate that a deep metaphor of technology as the agent or driver of social progress may underpin a substantial portion of recent scholarship.

This study examines the underlying metaphors that structure educational technology discourse in the social studies. Contemporary research in cognitive linguistics asserts that the use of metaphor, or understanding one thing in terms of another, is not merely an ornamental feature of language, but rather is a crucial factor undergirding how humans derive meaning from experiences (Lakoff & Johnson, 1980, 1999). According to this theory, human conceptual understanding becomes encapsulated in language in what Lakoff and Johnson (1999) called "primary metaphors" (p. 46) that are based upon physical, embodied experiences.

One category of examples are *spatial metaphors*, which are based upon physical orientation (Lakoff & Johnson, 1980). Examples include "happy is up; sad is down" and "more is up; less is down" (p. 15). The physical basis for the initial example is that sagging posture generally corresponds with sadness, while an erect posture generally indicates a positive emotional state. In the latter example, adding more to a pile makes a stack higher.

Spatial metaphors are one category among many primary metaphors that may exhibit “systematicity,” or a coherent and systematic organization that corresponds with physical experience. Many primary metaphors are acquired unconsciously in our earliest years of experience (Lakoff & Johnson, 1999, p. 47). Later, humans explicitly learn more complex *conceptual metaphors* that are based upon primary metaphors, which are utilized in higher, conscious reasoning processes.

While metaphors help structure conceptual understanding, they also have the potential to constrain comprehension, as they may obscure aspects of experience that are not consistent with the metaphor (Lakoff & Johnson, 1980, p. 157). Because metaphors are often used unconsciously, particular dimensions of experience that do not align with the deployed metaphor may be unintentionally ignored. In this way, metaphors have ideological implications in that they privilege one interpretation of experience over others (Hart, 2008). The use of metaphor may at times obscure a lack of factual or conceptual grounding for an argument (Musolff, 2012), meaning that a critical analysis of metaphor may help reveal flaws in argumentative reasoning that would otherwise go unnoticed.

Gozzi (1999) made a distinction between deep metaphors and surface metaphors. Deep metaphors exhibit systematicity and structure discourse. These metaphors may or may not be explicitly stated (p. 59), but are revealed by identifying a preponderance of explicitly stated surface metaphors. Surface metaphors may take the form of both primary and conceptual metaphors. Gozzi’s categorization of surface and deep metaphors was utilized in the analysis report here.

### **Literature Review of Metaphor Research in Education**

In recent years, multiple articles have reviewed research on educational technology in the social studies, although they have focused primarily upon the implementation of new technologies in various contexts (see Berson, 1996; Bolick, Berson, Friedman, & Porfeli, 2007; Bolick, McGlenn, & Siko, 2005; Fabos & Young, 1999; Hicks, Lee, Berson, Bolick, & Diem, 2014; Tally, 2007). To date, no scholarship has systematically investigated the underlying rationales for the inclusion of new technologies in the social studies. As metaphors are often employed to make sense of new dimensions of experience, social studies scholarship is rife with metaphors used to comprehend the new experiences and pedagogical possibilities surrounding digital media technologies.

Metaphor analysis is a relatively new area of research in education. Scholars have utilized it to explore how preservice teachers (see Brown, Parsons, & Worley, 2005; Kim, 2012; Koc, 2013; Shaw & Mahlios, 2008) or novice teachers (Fisher-Ari & Lynch, 2015; Gatti & Catalano, 2015) make meaning of their educational experiences. Popular educational discourse has been studied through metaphor, with examinations of the “teacher as professional” (Maxwell, 2015) as well as the act of “teaching as performance” (Pineau, 1994) metaphors, yet literature on metaphor analysis of educational scholarship is limited, particularly related to educational technology.

One exception is Smith’s (2013) explication of the “digital natives” and “digital immigrants” metaphors. Smith argued that these simplified generational metaphors marginalize teachers by positioning them as immigrants in a new world while valorizing technology as a savior of education. Smith’s framing of these metaphors informs this study, although he did not investigate specific research that employs these metaphors.

Gozzi (1999) identified several metaphors in education discourse, including the conduit metaphor of communication, the metaphor of the market in education reform discourse,

and the technological race metaphor used in arguments for standards-based measures, integration of new technologies, and other matters. Although Gozzi revealed important metaphors used in education, he did not conduct a specific textual analysis. The intention of this study is to fill the gap in the literature by performing an examination of the metaphors used in social studies research in order to better understand how researchers have utilized metaphor to make meaning of the rapidly changing realm of educational technology.

Within the field of social studies, the importance of metaphor on thinking has been acknowledged in recent publications on educational technology (see Hicks & van Hover, 2014; Manfra, 2014), yet there is an absence of systematic analysis about the uses of metaphor in social studies scholarship. In the late 1990s, the metaphor of technology as a “sleeping giant” was employed by Martorella (1997) and was later reexamined in a year of special themed issues in the social studies section of the journal *Contemporary Issues in Technology and Teacher Education (CITE Journal)* in 2014. The authors who published in the journal during this period used the sleeping giant metaphor to frame their studies and conceptual arguments, although none performed an intensive analysis of the use of metaphor in the sense that Lakoff and Johnson (1980, 1999) conceived of it as conceptual grounding for abstractions rooted in embodied experiences.

The special themed issues of *CITE Journal*, which included an updated version of the popular article on guidelines for technology instruction (see Hicks et al, 2014; Mason et al, 2000), signified that the field of social studies had arrived at a more grounded assessment of the possibilities of educational technology to enhance teaching and learning. Hicks and van Hover (2014), whose article was included among the special themed issues, illustrate the point:

Can technology serve as a forceful agent of change? Based on our data, no.... The notion of technology as a sleeping giant – a potentially powerful and autonomous force that, when woken can alone foster change within classrooms stubbornly clinging to coverage and control of factual content – carries with it the essence of a fairy tale. What is missing is the influence of context, the agency and purpose of teachers, the battle against the deep grammar of schooling with its habituated routines and antecedent subject subcultures of the discipline. (p. 152)

The authors asserted that the sleeping giant metaphor should be retired and any new metaphors regarding digital technologies should emphasize the learning process in particular contexts. These points make important contributions to the discourse. However, from Lakoff and Johnson’s (1980, 1999) perspective, most metaphors are more mundane than the florid sleeping giant metaphor. Moreover, metaphors are often used unconsciously by writers to either describe new experiences in terms of more familiar ones or to describe abstract experiences in terms of physical ones. Uncovering such metaphors and their assumptions requires a careful and sustained analysis of language, which critical metaphor analysis is intended to provide.

## **Methodology**

### **Framing the Study**

Critical metaphor analysis (CMA) has been identified as a subfield of critical discourse analysis (see Gatti & Catalano, 2015). CMA, like critical discourse analysis, assists in uncovering the practices and social relations made possible by the deployment of language. However, in critical discourse analysis there is an assumption of conscious

intention among language users (Charteris-Black, 2004), which is consistent with constructivism (Kivinen & Ristela, 2010). This assumption leads to analyzing the ideological intentions of the text creator. By contrast, CMA emphasizes primary bodily experience as an unconscious grounding and, thus, focuses on examining the assumptions that text creators employ as underlying reasoning for their arguments, which may or may not be consciously invoked.

The idea of unconscious experience providing the framework for metaphor is more consistent with the philosophy of pragmatism than with constructivism. Thus, the forthcoming text analyses will be similar to critical discourse analysis, but will focus more narrowly on the metaphors that provide the justification for normative claims regarding the deployment of new technologies. By uncovering assumptions through metaphor, the results could potentially reveal the cultural and ideological assumptions of text authors, even if those assumptions are not consciously intended (Charteris-Black, 2004).

Epistemologically, this study was influenced by the critical research tradition of pragmatism. Lakoff and Johnson's (1980, 1999) explication of metaphor is consistent with the pragmatists' embodied theory of meaning, along with the pragmatists' recognition that "there is a continuity between the material world and the world of consciousness, meaning, interaction, and communication" (Biesta & Burbules, 2003, p. 72).

The conception of metaphor as providing an unconscious foundation for linguistic conceptions is consistent with John Dewey's (1922) social psychology, which posited human action as largely automatic until a disruption triggers conscious awareness. The purpose of educational research, according to pragmatism, is to make human actions more intelligent (Biesta & Burbules, 2003, p. 38), and a critical examination of metaphor can reveal assumptions that could potentially allow educational researchers and practitioners to proceed with more focused intention when considering the role of educational technologies in teaching and learning.

Pragmatists recognize the importance of experimental science, but also identify other ways of knowing, such as aesthetic and artistic perception, as vital elements of intelligent inquiry (Cherryholmes, 1999). Under Lakoff and Johnson's conceptualization, metaphors permeate human thinking and make vital contributions toward the ability to think abstractly. Utilizing this conception makes an all-embracing, fully comprehensive analysis of metaphor within educational technology discourse impractical, because metaphors must be interpreted within particular contexts and in relation to other metaphors in a process that defies static categorization.

The intention of this study was to perform a critical, interpretive explication of the surface metaphors that may lead to one or more deep metaphors that provide the underlying rationale for arguments advocating for the inclusion of new technologies in education. Deep metaphors will be identified through pinpointing clusters of surface metaphors in particular articles, which will subsequently be compared across articles to look for prevalent metaphorical themes within the overall discourse.

As a brief illustration of what such an analysis would entail, consider the aforementioned article by Martorella (1997). In addition to writing about a sleeping giant, he also employed a plethora of other metaphors that may not have been consciously intended, yet nevertheless revealed assumptions about how he perceived the function of technology in the social studies. For example, Martorella asserted that "we have *entered* the information age" (p. 511). Note that italics are used within the text and have also been added within quotations here and elsewhere to highlight the metaphors being analyzed.

In this context, the verb *enter* is a journey metaphor, which is a spatial metaphor describing travel or movement. Such metaphors are often connected to idealized visions of social progress realized through technological advancement, which is reinforced by the term *the information age*. This term suggests that contemporary times are fundamentally different and, in particular, more advanced than previous eras.

The passive voice in the phrase implies an inevitable journey that is not under human control. Additional evidence for this interpretation can be located a bit later in the document when Martorella (1997) stated, “Our past technology has *reinvented* itself to accommodate the growing dominance of computers as media” (p. 511). In this case, the author personified technology, affording it its own intentions, which is consistent with the metaphor of the sleeping giant of technology as a personified, autonomous force.

Later on the same page, Martorella (1997) stated, “The Internet, both as a medium of communication and as a repository and catalog of information, continues to *grow* at a mind-boggling rate” (p. 511). Here, a biological metaphor of growth is used to conceptualize the proliferation of the Internet, which carries the assumption of a natural process not directly controlled by humans. This perspective is also consistent with the previous metaphors identifying technology as an autonomous force.

Using Lakoff and Johnson’s (1980, 1999) conception, Martorella’s metaphors of the sleeping giant, personified technology, and a biologically growing Internet exhibit systematicity by cohering around the assumption that technology has its own agency independent of human actors. Thus, arguably a deep metaphor of *technology as autonomous agent* was employed within the sleeping giant article by Martorella.

Hicks et al. (2014) argued that Martorella’s perspective has given way to a more realistic analysis of educational technology in social studies research. Given this perceived shift in the discourse in recent years, this study tested this assertion by analyzing the last three years of social studies scholarship within *CITE Journal*, which is the official journal of the College and University Faculty Assembly of the National Council for the Social Studies for educational technology research and, thus, represents an important center of discourse regarding these areas of inquiry.

Because prevailing metaphors usually represent the taken-for-granted assumptions within a community-of-practice (Martinez, Sauleda & Huber, 2001), any prevalent metaphors should be significantly present across multiple studies and could be understood to represent substantial aspects of discourse within the discipline. Because of the immense amount of financial investment in new educational technologies in recent years, along with the expansive amount of research devoted to the field including entire journals devoted to educational technology such as *CITE Journal*, a close interrogation of the assumptions that undergird this area of research is warranted.

## Data Collection

An initial review phase entailed an interpretive reading of a total of 17 articles in the social studies section of *CITE Journal* from late 2013 to late 2016, with a focus on the metaphors used to justify claims about using new technologies in the social studies. In this case, such claims were understood to mean that the authors made an overt justification for why teaching with new or digital technologies was necessary, important, or useful. This particular aspect was isolated because it targets concerns suggested by science and technology studies scholars and was preliminarily identified by the educational studies by

Gozzi (1999) and Smith (2013) that problematic assumptions are present within educational technology discourse.

Within this initial review, notes were made regarding any surface metaphors that were identified. Surface metaphors were conceived in light of Lakoff and Johnson's (1980, 1999) framework of conceptual metaphors based on primary bodily experiences. Context was also considered when labeling surface metaphors. If a metaphor was used to describe a point of view that was clearly different from that of the author, it was not included for further analysis. Only metaphors that authors used to advance their own positions were considered in the analysis. One article made no direct claims or justifications about new technologies and was thus excluded, leaving 16 articles for further analysis.

In the second phase of analysis, a subsequent interpretive reading of each article was performed. In this reading, closer scrutiny was given to the surface metaphors in each article and initial conceptual categories were identified by a repeated use of the same or similar surface metaphors around a single conceptual category; an example would be repeated assertions about "scaffolding" and "laying a foundation" which are *construction/building* metaphors. Surface metaphors were also considered against other prevalent metaphors in the article to search for evidence of consistency or inconsistency in how metaphors were utilized, which is relevant for considering whether a deep metaphor was present.

In a third phase, notes were studied in order to group identified metaphors into firmer conceptual categories. Categories of metaphors that were identified less than three times in any particular article were excluded from further analysis, as these could be explained as authors' simply using expressive language rather than a metaphor structuring their thinking. In a fourth phase, metaphor categories that were deemed significant in single articles were considered across other scholarship to locate patterns that could be understood to represent deep metaphors as underlying assumptions in the discourse. Greater repetition of particular metaphors and wider variety of metaphors that intersected around clear conceptual categories were taken as stronger evidence that a deep metaphor was underlying the author's prose.

Metaphor categories that were identified three or more times were deemed significant, while those that were identified six or more times were labeled as extensive in the analysis, as the greater presence of these metaphors made it more likely that they were acting as a structuring conception for the authors.

## **Analysis**

The vast majority of surface metaphors were grouped into one of five conceptual categories (see Table 1), although metaphors are rarely fully systematic and exclusive. Thus, some overlap is inevitable and requires a hermeneutical analysis to unpack. Categories emerged out of the analysis. They were inspired by examining key concerns from authors associated with science and technology studies (STS), including such authors as Andrew Feenberg, Don Ihde, Leo Marx, Neil Postman, and Christopher Lasch. STS conceptions were considered in light of Lakoff and Johnson's (1980, 1999) research into metaphor as a largely unconscious feature of discourse based upon primary bodily experience. Media studies scholar Raymond Gozzi (1999) previously identified the technological race metaphor, which is included within the fifth category of journey metaphors.

**Table 1**  
Metaphor Categories Identified Three or More Times by Article With Common Terminology

Article Author(s)	Manual Labor	Construction/ Building	Mechanistic	Biological/ Agent	Journey
Pearcy, 2013	n/a	n/a	Integration <sup>a</sup>	Evolution <sup>a</sup>	Barriers <sup>a</sup> Hurdles Various terms
Manfra, 2014	n/a	n/a	n/a	Evolution <sup>a</sup> Various terms	Various terms <sup>a</sup>
Friedman, 2014	Tools <sup>a</sup> Impact	n/a	n/a	Evolution <sup>a</sup> Various terms	Various terms <sup>a</sup>
Hicks & Van Hover, 2014	Tools <sup>a</sup>	n/a	n/a	n/a	n/a
Hofer & Swan, 2014	Tools <sup>a</sup>	n/a	n/a	n/a	Explore
Hammond, 2014	Tool Impact	n/a	Integration <sup>a</sup>	Transform <sup>a</sup> Adopted Various terms	Various terms <sup>a</sup>
Hicks et al, 2014	n/a	n/a	n/a	n/a	n/a
Crocco & Leo, 2015	n/a	n/a	Connections <sup>a</sup> Various terms	Various terms <sup>a</sup>	Various terms
Hartshorne & Waring, 2015	n/a	n/a	Integrate	Various terms	Various terms <sup>a</sup>
Shifflet & Weilbacher, 2015	Tool	n/a	Integration <sup>a</sup> Connection	n/a	Barriers <sup>a</sup>
Mason, 2015	Tools	n/a	Integrate	n/a	n/a
Sheffield, 2015	Tool	n/a	Integrate <sup>a</sup> Disconnect	n/a	Various terms
Callahan, Saye & Brush, 2015	n/a	Structuring <sup>a</sup> Supporting Scaffolding Various terms	Integrate <sup>a</sup> Connectedness	n/a	n/a
Krutka & Carpenter, 2016	n/a	n/a	Platform <sup>a</sup> Various terms	Various terms <sup>a</sup>	Various terms
Maloy, 2016	n/a	Construct <sup>a</sup> Various terms	n/a	Various terms	n/a
Jo, 2016	Tool	n/a	Integration	Adopt	Barriers <sup>a</sup> Various terms

<sup>a</sup>Indicates metaphor categories that were identified six or more times in a given article

The first category is identified as *manual labor metaphors*, which suggest that teaching is akin to performing physical labor; these sometimes overlapped with *construction/building metaphors*, which were consistently cited in passing but were only significantly present in two of the 16 articles. The pervasiveness of such metaphors in general education may account for their presence in this study, but they do not appear to be essential to understanding educational technology research and will thus be ignored. The third category, *mechanistic metaphors*, indicate that teaching and learning is like a complex machine.

The fourth category is *technology as biological organism/agent metaphors*, which imply that new technologies are biological organisms and appear to be closely tied to the additional assumption that such technologies have their own autonomy and agency. The fourth category was often used in conjunction with the fifth and final category, *journey metaphors*, which suggest that the field of education is on a journey leading toward greater use of new technologies which will yield positive consequences for teaching and learning. The fourth and fifth categories intersected in instances where writing intimates that technological devices have agency that is propelling the journey toward improvement. As will be further explained in the discussion section, the fourth and fifth categories appear to have particular significance for considering how educational technology discourse is structured through metaphorical conceptions.

### Manual Labor Metaphors

The presence of manual labor metaphors was significant in eight of the 16 articles. The single most pervasive metaphorical term in the literature described technology as *tools*. This metaphor is widely employed for devices that are used for abstract labor, but in Lakoff and Johnson's (1980, 1999) conception, such metaphors are necessarily rooted in primary embodied experiences. Considered in relation to embodiment, a tool is a handheld device used to accomplish some form of physical labor. A tool, such as a hammer, aids in a human's ability to apply physical force to an object.

An accompanying metaphor was often the term *impact*, which is a description of force applied from one object to another. For example, teachers might "analyze classroom practice and student learning for *impact* of Web 2.0 *tools*" (Hicks & van Hover, 2014, p. 144). Another commonly employed metaphor was *leverage*, which implies exerting force using a lever, a pivoting bar that aids in the lifting of heavy objects. When teaching is conceptualized as manual labor, one can use *tools* and *levers* to increase one's strength and efficiency. Thus, in this conceptualization researchers might examine how "social media can be leveraged" (Krutka & Carpenter, 2016, p. 53) to improve teaching and learning.

### Mechanistic Metaphors

Mechanistic metaphors, which compare teaching and learning to a machine or mechanism, were significantly present in 10 of the 16 articles studied and extensively present in seven of them. The most commonly employed term was *integration*, in the form of "integrating" technology into the classroom. To integrate means to put parts together to make something complete; online dictionaries use examples of an integrated circuit, although the term is often used in other domains.

On its own, this term most likely does not suggest a deep mechanistic metaphor in the discourse, although it does imply that education is incomplete without the addition of new technologies. However, the term integrate was often utilized in conjunction with other mechanistic metaphors, such as *connection*. To connect means to bring two things together. In terms of the physical world, connection usually involves a cord that connects a piece of machinery to an electrical outlet or a bridge that connects two towns. Thus, researchers might analyze the "*connection* between beliefs and technology *integration*" (Shifflet & Weilbacher, 2015, p. 368).

In several articles, when something within the classroom environment did not go as expected, it was described as a *disconnect*. The act of disconnecting implies unplugging a cord. One example referred to a "*disconnect* between the IWB *tools* and the teachers' preferred way of teaching" (Sheffield, 2015, p. 555). In this case, the technology and the



teaching method *connect* within the metaphorical “matrix” of the classroom, and the *disconnect* implied that the mechanistic association of the teacher and tool has broken down. Other terms such as *link* and *network* also regularly appeared in the discourse and have similar implications.

### Technology as Biological Organism/Agent Metaphors

The final two categories appear to be crucial for uncovering the role of deep metaphor in educational technology discourse. The previous metaphorical groupings, although commonly invoked within the reviewed articles, consisted of a few specific terms that were used repeatedly by several authors. Arguably, although the previous categories drew upon the source domains of mechanisms and labor, the cited terms have long been applied to educational technology and thus do not provide convincing evidence of unexamined assumptions in the discourse. However, the fourth category offers a stark contrast through its wide variety of discrete terms that were often creatively deployed by authors.

This assortment of terms and phrases coalesced into two interrelated conceptions of *technology as a biological organism* and *technology as an autonomous agent*, which appeared three or more times in nine articles, out of which six articles featured extensive deployment of such metaphors that provided the main structure for the authors’ arguments.

Some of the identified terms suggesting that technology is a biological organism included arguments about the *evolution* of technologies, referring to new technologies as the *next generation* or being in their *infancy*, wondering when technologies will be *adopted*, noting that technology has *spawned* other developments, and statements that speak to the *nature* of technologies. Among them, *evolution* was the most common and was significantly present in seven articles.

By definition, evolution is a natural process by which organisms change through adapting to their environments in order to survive. Organisms successfully evolve when they adapt over successive generations in order to better meet environmental demands. Arguments about the *evolution* of technology, thus, imply a conception of technological change that is natural and beyond direct human control. For example, “Starting around 2004, the Internet began to *evolve* from what was essentially a one-way conduit of information to one in which anybody could easily and immediately post content online” (Friedman, 2014, p. 15).

By using the evolution metaphor in this manner, new technologies were positioned as naturally adapting to better fit learning environments over time. This positioning suggests that fear and hesitancy are unwarranted, as the educational efficacy of new technologies is improving and will only continue to improve.

Another example associates the metaphor of evolution with a journey metaphor on a path that has a predetermined destination, stating “the *end stage* of this technological *evolution* is that teacher education students will eventually not require instruction in geospatial tools” (Hammond, 2014, p. 280). Here, technology was again positioned as natural and, in this case inevitable, with students becoming better users over time and technology becoming easier to utilize, thus lightening the burden on teachers.

Other metaphors referred to technologies as both biological and life-generating: “the *growth* of the Internet *spawned* the plethora of digital history resources that are now available” (Friedman, 2014, p. 14). In this example, digital history resources were

positioned as a natural development reared by a maturing Internet. In another example, the claim was made that geographic information systems (GIS) software is, “*migrating* from a clumsy, client-*tool* requiring a steep learning curve to far more user-friendly web services. The *next generation* of GIS tools will be on mobile devices, with far more intuitive interfaces, such as drag-and-drop tables” (Hammond, 2014, p. 280).

Migrating is a journey metaphor, which will be discussed in the next section, but in conjunction with the term the *next generation* implies someone moving to a more technologically advanced country and having children, who would presumably be a better fit for the culture. Again, the metaphor is organic and natural, with the technology becoming a greater benefit to teachers over time in a process that was positioned as inevitable by way of the metaphors.

There was a strong overlap between authors who conceptualized technology in organic terms and authors who envisioned technology as having autonomy or agency independent of human actors, suggesting that these conceptions were associated in the thinking of many authors. There is a logical connection between biology and agency, as biological organisms exhibit their own intentions in the world. Technological agent metaphors generally made claims about what technology can accomplish in education independent of human involvement.

One example asserted that during 1999-2000, “the Internet had begun to *make inroads* in schools and received wide acclaim in the social studies literature” (Friedman, 2014, p. 15). In other cases, the agency of technology was positioned as superseding that of teachers. An example in one article claimed that “emerging technologies *require new roles* for both teachers and students” (Manfra, 2014, p. 6). In both cases, technologies were positioned as having intentions or performing actions independent of humans.

Other authors also wrote about the *power* of technologies to affect learning in autonomous terms (Friedman, 2014; Krutka & Carpenter, 2016). Some of the strongest claims for technology’s agency came from Hammond (2014), who explicitly invoked Martorella’s sleeping giant and contended that as long as technology integration continues in classrooms

geospatial *tools* will *make their way* into the discourse. As they do, these technologies will *reinforce* powerful teaching by *allowing* teachers to *deepen* curricular content, *highlight* conceptual *frameworks* for historical understanding, and *connect* to local history. If the teacher education community takes an active interest in geospatial tools for history, this day will come faster and the changes will be more profound. But, given enough time, the *giant* of geospatial technology will *awaken*, and the history curriculum will not be the same as before. (p. 281)

This passage illustrates in rather stark terms what is present in a substantial portion of educational technology discourse in the social studies, according to these findings. Technologies have been, in many cases, positioned through metaphors as having intentions that are largely independent of human actors, and such processes were deemed natural and inevitable.

## **Journey Metaphors**

The final category holds profound implications for deep metaphor and is evidenced by a wide variety of different phrases and terms that center on movement or travel. Such metaphors were significantly present in 11 articles, and among those, journey metaphors

were extensively deployed in seven of them. Examples include new technologies affording *access* to learning or areas that are *uncharted territories* or *unexplored frontiers*, referring to technology as a *route* to success, arguments about technology *moving* education *away* from one thing (usually passive learning and teacher-centered instruction) *toward* another (usually active, student-centered learning), arguments about *overcoming barriers* or decrying the lack of speed in implementing technology, all suggesting some relation to furthering or impeding a journey through the deployment of new technologies.

The idea of *moving beyond* existing practices appeared multiple times in the discourse. One article argued that “researchers and practitioners in the field of social studies have clearly begun *moving beyond* the perceived *reluctance to embrace* digital technologies as *change agents*” (Hartshorne & Waring, 2015, p. 202). Here, a journey metaphor was combined with a technology as autonomous agent metaphor to state that progress in the discipline’s journey toward betterment is dependent upon an open acceptance of new technologies.

In the article titled “Struggling to Move Beyond Projection,” Sheffield (2015) considered the barriers that impede the use of interactive whiteboards in classrooms. The idea of *barriers, obstacles, hurdles, or roadblocks* hindering the implementation of new technologies appeared in several articles, with the implication being that once the barriers are removed, the journey toward educational progress can resume. Impediments to the journey can also be expressed with more florid metaphors, such as being victimized or imprisoned: “new teachers, *fresh* from their universities, may be expected to *escape* this reluctant attitude, but many of them seemingly *fall victim* to” what the author identified as various hurdles to implementing new technologies (Percy, 2013, p. 6).

Sometimes journeys were conceptualized through the use of speed or racing metaphors. One example contended that teachers “have been *slow to infuse* ubiquitous technologies, such as the smartphone” (Sheffield, 2015, p. 542). Another example stated “that a field *grounded* in citizenship education seems continually to *lag behind* during an age of historically unprecedented technological change is particularly problematic” (Krutka & Carpenter, 2016, p. 39). In either case, the solution is to speed up the immersion of digital technologies into the social studies classroom, which will implicitly allow the journey toward betterment to resume. New technologies can move the field away from passive, teacher-centered learning toward active, student-centered classrooms (Percy, 2013), according to the positioning of the race metaphor.

Another example employed the metaphor of *transition* to describe this journey, which is defined as a move from one state or stage to another:

as the consumption-based model of technology *integration transitions* to a participatory approach and technology *transitions* from a *tool* for accessing information to a *tool* to (a) support student authoring and creativity, (b) facilitate collaboration, communication, and social learning, (c) allow for more efficient organization and accumulation of resources, (d) *provide* venues for student voices through publication and sharing, and (e) *support* student immersion in learning environments, educators also *transition*. (Hartshorne & Waring, 2015, p. 203)

Here, the journey from one stage to another combined with a metaphor of technology as autonomous agent, as the description suggested that the role of the teacher will inevitably coincide with the transition that is being led by new technologies.

## Discussion

Because humans cannot effectively write or think without using metaphors (Lakoff & Johnson, 1980, 1999), metaphors should not be identified as positive or negative features of discourse without specifically interrogating their implications. Evaluating metaphors is best executed in specific discourse communities by assessing the particular consequences in application. Given this orientation, the first category of *manual labor* metaphors appears to be relatively benign. However, it would sharpen educational technology discourse for researchers to consider how digital technologies do not function in the same ways as hammers or other manual tools.

The next category, *mechanistic metaphors*, which conceive of the process of teaching and learning as a complex machine, is potentially more problematic. The idea of integrating technology can be useful when it implies that technology is merely one part of a larger project of teaching and learning. It becomes potentially problematic if taken to mean that teaching and learning is incomplete without new technologies, which reduces the roles of teachers as contextual decision makers by giving over their agency to the presumed inevitability of new technologies.

From this perspective, *mechanistic metaphors* can become particularly problematic when used in conjunction with *technology as biological organism/agent* and *journey metaphors*, because this framing could result in the concerns and goals of teachers and the needs and desires of students getting lost in the thrust to impose new technologies.

Other mechanistic metaphors such as *connect*, *disconnect*, and *networks* are all common parlance in discourse about technology in popular culture, so it is unsurprising that scholars also employ them. However, the metaphorical conception of a mechanism that underpins these words is rarely explicitly considered. Educational technology researchers would benefit from a more serious consideration of these terms and how they structure the discourse in ways that may often be applied uncritically.

As one hypothetical example of potential significance, conceiving of a group of citizens as a “community” versus a “network” may lead to very different assumptions about the productive roles and behaviors of citizens. Neither term is correct or incorrect, but employing either conception has consequences. It would sharpen the discourse in educational technology to become more deliberate about the use of such metaphors.

The metaphorical category of teaching and learning as a *mechanism* creates an interesting dynamic when used in conjunction with metaphors of *technology as biological life/agent*, and six of the 16 articles showed significant use of both categories. In effect, the use of metaphors in these articles imbued technology with life and autonomy while it simultaneously reduced the complexity of teaching and learning by conceptualizing it in mechanistic terms. This approach may achieve a rhetorical goal of advocacy for educational technology, but it may also skew the dimensions of what technologies can help teachers achieve, while diminishing the status of teachers as principal decision-makers within the context of their own classrooms.

In this sense, such rhetorical moves may contribute to disempowering teachers while bolstering technologies, goals that incidentally align with the education reform movement. In addition, conceiving of technology as living and autonomous risks decontextualizing the role of technology, teachers, and students in the learning process. It also renders moot discussions about the appropriateness of specific technologies for

particular classroom contexts, which could potentially lead to less effective implementation of new technologies.

Utilizing language that references technology in autonomous terms also hides the particular forces and interests that may benefit from such promotion (Selwyn, 2014). The National Center for Education Statistics estimated that K-12 schools spent approximately \$10 billion on digital technology in 2013, demonstrating that technology companies and investors have much to gain from the ubiquitous inclusion of digital technology. Thus, calls for pervasive technology should be understood to represent particular interests that are not always benign.

Journey metaphors can be useful, for example, when describing contextual barriers to implementing new technologies. However, they can also be problematic when, as was often found in this study, they are based on assumptions that the present is better than the past and the future will be better still. A quick assessment of current national or world affairs should quickly dispel this notion. The tendency to conflate technological progress with social progress has been identified in science and technology studies as a common problematic assumption in American thinking (see Lasch, 1991; Postman, 2000). When this assumption remains unchallenged, it obscures clear thinking about the effective uses of new technologies in classrooms.

The future will certainly be different than the present, and new technologies will likely continue to be developed, but educational progress is only possible if educational researchers conduct thoughtful, ongoing evaluations of what is needed in particular circumstances. This evaluation may include many new technologies, but a more grounded assessment could allow for inclusion without the same level of anticipation, followed by the inevitable disappointment when technologies fail to meet expectations. Put another way, new technologies should not be exempt from processes of inquiry. Rather, they should be studied with the same degree of thoughtfulness and skepticism as any new classroom technique or method.

Another important finding is that eight articles featured significant use of both *technology as biological organism/agent metaphors* and *journey metaphors* together, with the journey metaphor often being used to highlight technology's agency in furthering progress. This finding suggests that in a substantial portion of the discourse, there is a deep metaphor of *technology as the agent or driver of social progress* underlying the thinking of many authors. This finding also helps to explain why mechanistic metaphors were often used to describe teaching and learning by many of the same authors, as this reductionism makes classrooms seem more amenable to technological solutions.

Six articles included significant deployment of *mechanistic metaphors* in conjunction with *technology as biological organism/agent* and *journey metaphors*, which strongly suggests that these conceptions are associated in the minds of many authors as indicating the power or agency of technology to transform teaching and learning. These results contest conclusions in recent scholarship (see Hicks et al., 2014) that the discourse in educational technology has become more grounded in recent years. Assumptions of technology as an active agent of social progress still appear to be a prevalent element of the discourse in the field.

Conceiving of technology in autonomous terms represents a form of technological determinism that rhetorically wrests agency away from teachers and communities and places it in the hands of large-scale capitalism, which unwittingly aids the forces associated with the education reform movement that are eager to reduce teacher autonomy. Such

determinism should be resisted by employing thoughtful reflective analysis into what is needed to improve teaching and learning, which may or may not include new technologies.

## Conclusion

This study found that several categories of metaphors have a strong presence in educational technology discourse. Some of these metaphors are largely benign, but conclusions suggest that, despite claims that the discourse has found soberer grounding, problematic assumptions persist. Using new technologies in ways that can improve teaching and learning begins with clear conceptions of educational goals and the ways that technologies can help achieve them. This process necessarily begins with examining assumptions about technologies and their uses in classrooms.

CMA helps make explicit the reality that technology cannot give directions in classrooms; it can only be done by teachers and other educational professionals. Similarly, technology cannot be an agent of change, only humans can perform that function. Technology may be useful for achieving these purposes in particular contexts, but utilizing language that affords undue agency to new technologies obscures a more realistic assessment of the ways that new technologies can facilitate inquiry-based and student-centered learning.

These results suggest that educational technology researchers should more explicitly attend to their own assumptions about technology that gets expressed in their research. Although metaphors tend to be employed unconsciously, writers have the ability to scrutinize their own writing for such assumptions and to reflect upon how it influences their perspectives. This article is intended to facilitate this process in order to encourage a more thoughtful consideration of how new educational technologies are employed in education.

Given the results of this study, researchers in educational technology should resist employing journey metaphors that suggest that educational improvement is solely dependent upon new technologies. Scholars should also consider limiting or even eliminating metaphors that imply that technology is alive or has its own intentions. In its place, researchers should more carefully scrutinize those who create new technologies for the underlying interests they serve and the specific goals that they can help achieve.

The broader consequences for teachers, parents, and communities should also be examined in light of how technology often gets positioned through journey and agency metaphors. A range of consequences, both positive and negative, always follows from the implementation of new technologies. Being more attentive to language could allow the field to more fully consider these effects ahead of implementation, potentially allowing for more pointed and effective uses of new technologies to support teaching and learning.

It would also be useful to consider alternate metaphors to describe the process of teaching and learning beyond mechanistic conceptions. For example, the metaphor of *weaving a tapestry* has been suggested as a novel way to conceive of curriculum development (Simon, 2013). Considering how technology could fit within this tapestry would allow for creative reconceptualizations of the relationships between new technologies and education. Employing this and other metaphors could allow for more flexible ideas that avoid the aforementioned pitfalls while potentially fostering unforeseen benefits for teaching and learning.

## Author Note

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