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"We should have brought the tank": Hypermediated Interactivity in *Red vs. Blue*

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Abstract

Machinima, the practice of adapting recorded video game play into short films, highlights an often unacknowledged but significant shift in the consumption of video games and represents a key and underexplored intersection between the two leading theoretical camps. Considering the landmark series *Red vs. Blue* through the lens of Bolter and Grusin's propositions about "new" media's relationships with other forms offers an entry point for theorizing not only machinima but also the intersections between the ludology and narratology positions in games studies.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Machinima, the practice of adapting recorded video game play into short films, highlights an often unacknowledged but significant still shift in the consumption of video games and represents a key and underexplored intersection between the two leading theoretical camps.[1] Considering the landmark series *Red vs. Blue* through the lens of Bolter and Grusin's propositions about "new" media's relationships with other forms offers an entry point for theorizing not only machinima, but also the intersections between the ludology and the narratology positions in games studies.[2] Although "interactivity" has long been one of the categories of video game criticism, it tends to obscure the fact that the consumption of any visual media is inherently interactive. The emphasis on the idea of interactive narrative (based on the influence of Henry Jenkins, Janet Murray, and other scholars) has led to video games studies which largely consider interactivity as a one-way process. As a counter, the *ludic* approach, favoured by Espen Aarseth, Marku Eskelinen, and others, eschews narratology in favour of considering games as distinct because the act of playing makes each encounter somewhat distinct. Indeed, Aarseth goes so far as to write, "the key elements, the narration and the game play, like oil and water, are not easily mixed" (50-1). However, many of the same arguments—on either side of the debate—could be made for a stage-play, whose audience often becomes a key element in any given rendition! It is little surprise, then, that we often read, both in academic

[1]Traditionally, there has been a distinction between computer games and video games. While all video games require a computer of some sort, not all computer games are video games. Text-based adventure games, for example, rarely are considered video games. As well, many gameplayers and scholars prefer to make distinctions among console, arcade, and computer-based games. For the purposes of this paper, the popular term "video games" will apply, especially since the *Halo* series qualifies as such.

[2]While I prefer "digital culture" to "new media," this paper will adopt the latter term for the sake of agreement with the preponderance of theorists cited.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

and in popular criticisms, of the effects of video games on players rather than the opposite being the case. Thus, machinima episodes reify the extent to which video game play has moved away from a consumption-based version of interactivity towards a relationship in which the player is clearly an always already producer of culture. While playing (with a game) is still a large part of the activity, the ultimate product hinges on a narrative. *Red vs. Blue*, one of the most popular internet-based machinima series, exemplifies this growing trend through its ongoing manipulations of the popular game, *Halo*, and its successors.

While video games (such as racing and amusement park "construction sets") have offered players the opportunity to create their own levels and maps at least since the days of the Commodore 64, *Red vs. Blue*'s episodes, which purport to portray the life of the game's characters when the game is not in play, represent a type of mediated experience that cannot be encompassed sufficiently by the prevailing trends in video game scholarship.[3] While it might seem logical to turn to cinema, to television or to "new" media scholarship, these betray their various biases via their concentration on the aspect the theoretical position approaches. As a symptom of this trend, there seem to be as many technical papers about the computational aspects of machinima, in journals such as the *IEEE Spectrum*, as there are about the medium itself.[4] Even scholars whose goal has been to bridge and to map these conceptual and scholarly

[3]Here, Electronic Arts' *Racing Destruction Set* stands out as a notable early example. As well, *Seven Cities of Gold* and *Lords of Conquest* were among the games that had creation routines to create new worlds for each particular game play session.

[4]For example, David Kushner's piece, "Machinima's Movie Moguls," appears in *IEEE Spectrum*, while the most recent (2009) version of the *Handbook of research on computational arts and creative informatics* (James Brahman, *et al*, IGI Global) contains a chapter on machinima production. The trend coincides with increased production costs for film and for TV and, since 2008, with the global economic downturn.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

divides do not yet offer a means of theorizing that elucidates machinima productions, which weave play and story on many levels. In their book, *Remediation: Understanding New Media*, Jay David Bolter and Richard Grusin explain developments in new media by first examining their relationships with previous techniques. The process of rejecting, revising, and reproducing other media, or what they call "remediation," takes two forms: immediacy and hypermediacy. Immediacy refers to the tendency of media forms to be transparent, or realistic. The latter concept describes the tendency of a new combination of media to draw attention to its own artificiality, or mediated elements. First, the avatars and the space are obviously from a video game, whether or not viewers are aware of *Halo*. Regardless, it does not take long to discover that the source code of *Red vs. Blue* comes from a video game. Therefore, viewers already know that video game characters do not have "off-screen" lives. The characterizations, despite the uniform blandness of the "performers," whose only distinguishing feature is the colour of their battle armour, furthers the sense of hypermediacy. There is also a "female" character, whose gender is only revealed during an episode in which an accident breaks the electronic box that alters her voice. This serves as a reminder that one can never be sure of the identity of an online player. Finally, the series is entirely web-based, which further removes it from concerns of immediacy. In contrast, its dependence on *Halo* renders *Red vs. Blue* as a project that is almost entirely an exercise in hypermediacy. At the same time, *Red vs. Blue* shares many affinities with other Internet shorts such as *Homestar Runner*. These, in turn, have followings that resemble "cult TV" and fan fiction. The current iterations may exist in digital realms, but the scholarship inevitably winds it way through Jenkins' positions in *Textual Poachers*—or those like them—which again run counter to game studies scholarship, and which do not fully encompass the extra elements of play afforded by the video games. In this regard, the fan fiction approach does not

Volume 13, Number 3: December 2012
ISSN: 1535-0975

just focus on the story; instead, it focuses on a presumptive story about the form, and its creators, as enacting resistance to late-capitalism. In contrast, machinima openly celebrates the product, the technology, and occasionally resembles contemporary skateboard culture's pandering for corporate sponsorship over romanticized DIY politics. Nevertheless, the two species of Bolter and Grusin's remediation can help to locate intersections of narratology with more ludic approaches, though without naming or elucidating them as such. Thus, the task remains to identify and to elaborate these intersections to provide an approachable paradigm for analysis. While remaining mindful of *Red vs. Blue*'s cult status, my paper will examine *Red vs. Blue* and offer an approach to reading video game play, one which goes beyond concerns of interactivity and performativity, and which considers the form as an outlet for multiple simultaneous hypermediated productions.

Get the flag rookie: The case for immediacy

According to the Machinima Academy of Arts and Sciences, the name of the hybrid form derives from a combination of machine and cinema. It refers to the art of creating movies using techniques adapted from 3D modelling and from 3D animation produced by and within a video (or computer) game engine. Machinima can also refer to the output, to the style or to the product of the process. Paul Marino, head of the New York-based academy, claims that a 1996 production based on the popular game, *Quake*, "was the first time that someone had broken free of the first-person totally immersed perspective" (qtd. in Whyte). Regardless of the origins, or of the methods employed by machinimators, as the creators call themselves, Marino echoes the double logic of remediation that Bolter and Grusin outline: "Our culture wants both to multiply its media and to erase all traces of mediation: ideally, it wants to erase its media in the very act of multiplying them" (5). The central problem for most media producers has been creating the

Volume 13, Number 3: December 2012
ISSN: 1535-0975

impression of being there, no matter which media form is in question, because "immediacy dictates that the medium itself should disappear and leave us in the presence of the thing represented" (6). The desire for transparency causes some seemingly contradictory tendencies, even in largely hypermediated productions. Bolter and Grusin conclude that as each successive generation of technology allows a greater degree of media transparency, it is entirely possible for immediacy to depend on and even to be embedded in a hypermediated text or site.

The subtitle for *Red vs. Blue, The Blood Gulch Chronicles*, hints at its combination of immediacy embedded in hypermediacy. Simply put, "being there"—*i.e.*, the logic of immediacy—could not exist without the hypermediated game and its immersive environment. *Halo* is one of the most popular video games produced to date. In its first-person shooter form, it chronicles the exploits of Master Chief, the last surviving Spartan, as he battles the Covenant on a ringworld known as Halo. However, the multi-player variants of the game occur within more specific locations. Blood Gulch, the setting for *Red vs. Blue*, is one of those locations. Part of the immediacy, then, of *Red vs. Blue* might derive from its negotiation of its well-defined—and extremely well-known—world. Story development has been impacted by the limits of the game. For example, an early episode in which the blue flag is captured could only be "filmed" with the Red and the Blue characters within the space because of the (algorithmic) rules of the game. The appearance of orange, pink, black and green characters had to wait until another episode. The creators report that some of the special effects in the game—such as the flying bullet casings, to which fans negatively responded—were unknown until filming began. An ongoing source of frustration is the idle function embedded in the game, which causes an idle avatar to "wake up," which in turns interrupts filming. Fan reception of *Red vs. Blue* confirms the importance of its authors' ability to operate within the parameters of the game engine. In the commentary

Volume 13, Number 3: December 2012
ISSN: 1535-0975

accompanying the Season One DVD, writer/director Burnie Burns and his colleague Geoff Fink explain the production methods, the content choices, and the fan reception of the web program. They frequently refer to the "game engine" of *Halo* and the challenges they faced. Burns calls *Halo* "a beautiful game" and a "great world for us to do all these videos in." Nevertheless, operating within the parameters of the game can be difficult. For example, one of the first shots of the first season, which was meant to mimic a crane shot, required forty-five minutes of shooting to produce "five or six seconds" of actual running time.

The director and the actors also cite the responses of fans to the series, both in emails and in the online forums, which are included in the website, and which are cited in the commentaries for the DVDs of each season. As Burns explains, after episode one, "Griff was on top of Blue Base and Simmons was on top of Red Base. We didn't think anybody would notice. I like the lighting better [. . .] but people knew the geography and they could see the logos in the background [. . .] Boy, they went nuts." Thus, when filming subsequent episodes, *Red vs. Blue*'s creators responded to the reactions of fans. Similarly vociferous fan reactions occur whenever there has been a perceived a change in the voices of the characters. In such an instance, the creators reveal in the accompanying commentary of the Season Two DVD that they only changed the voice filters; that is, the filter which replicates the sound of speaking in the helmet. This type of fan ownership demonstrates the constant negotiation of the remediation process and will be a topic of further discussion.

There are some notable exceptions to the effort towards immediacy, at least as far as the game world is concerned. These occur through the efforts of the creators to maintain the limits of the game. The contemporary entertainment industry would call machinima a "repurposed property"; that is, something taken from one medium and reused in another (qtd. in Bolter &

Grusin 42). The creators of *Red vs. Blue* allow that they have employed Adobe Premier editing software to create some of the "ghost characters" who appear in the series.[5] As well, the multi-player version does not include the planes of the first-person shooter. To mimic a plane's bombing run, the team edited and dissolved a series of grenade tosses. The sound, with the exception of explosions and gun-fire, is largely taken from "real" life. More telling is the obsession fans have for the character of Tex. Since the inception of the show, fans have claimed to see Tex, the only character with a cloaking capability, in nearly every episode. They have included the time at which the appearance occurs and have uploaded screenshots documenting the alleged apparition. In addition to its repurposing of *Halo*, *Red vs. Blue* also remediates television. The creators explain that their version of military humour derives not from experience—only one member of the team has any military experience—but from the stereotypical characterizations and what they term "office" or "bureaucratic" humour. In any case, they report, and their message boards confirm, that members of the armed services find affinities between their experiences and the humour employed by *Red vs. Blue*.

What's a Warthog? The case for hypermediacy

Bolter and Grusin explain this type of reception through the dual logic of remediation. They always conclude that transparency "remains the goal," though they allow for refashioning the older medium or media "while still marking the presence of the older media and therefore maintaining a sense of multiplicity or hypermediacy" (46). This occurs, they argue, because the

[5]A "ghost character" refers to a computational device game developers employ to track an avatar's movements through the game world. While they can be used to test games, ghosts have become features of games so that players can watch their own gameplay or that of an idealized figure (Sandifer). Racing games, for example, often have ghost features to show players the best route around a given track.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

"digital medium wants to erase itself, so that the viewer stands in the same relationship to the content as she would if she were confronting the original medium" (45). However, the act of refashioning and of leaving the viewer in the same relationship to the medium not only occurs because of hypermediation, it is a manifestation and a reminder of the hypermediated basis of that original production: "The very act of remediation, however, ensures that the older medium cannot be entirely effaced; the new medium remains dependent on the older one in acknowledged or unacknowledged ways" (47). This is not entirely the case, since there are at least two other reminders of the game besides its limitations: the targeting reticle and the efforts required to create the occasions in which it does not appear. In this regard, the targeting reticle—the circle with a concentric dot on the middle of the screen—is a nearly permanent reminder of the original game. It becomes more difficult to employ because it requires the avatar to have a gun in hand, often the shotgun, which is in turn a more challenging item to control. There is another, unacknowledged character/avatar in the space. The reticle changes colour based on a friend-or-foe identification system. It can be turned off provided the settings of the game have an extremely low response time selected. Players are not likely to do this in a multi-player game. It would make such play tedious and almost pointless. Here, some of Bolter and Grusin's undertheorized or unconsidered corollary findings might provide a suitable basis for theorizing the process. They observe that "[r]efashioning within the medium is a special case of remediation, and it proceeds from the same ambiguous motives of homage and rivalry—what Harold Bloom has called the 'anxiety of influence'—as do other remediations" (49). This line of thinking situates the theory of remediation among existing paradigms. Said another way, remediation itself remediates preceding theories. Northrop Frye, to whom Bloom pays tribute, and others would concur that the very act of authoring is itself the act of refashioning (*Anatomy*

Volume 13, Number 3: December 2012
ISSN: 1535-0975

95). M.M. Bakhtin's oft-cited "genre of genres" functions along the same lines (cf. 8). That said, a consideration of machinima offers an opportunity to propose a third level of remediation, one that resists immediacy in and through the acts of rivalry and homage, while simultaneously resting squarely on the intersection of ludology and narratology. The creators of *Red vs. Blue* frequently cite rivalry and (especially) homage as essential motivations for their remediation project and its intended responses. This is important because while they are playing for the sake of playing, the story as much as the game is the vehicle for that play. Moreover, the story is the product of that play.

As much as Red vs. Blue operates within the logic of remediation, it points to an unexamined observation in Bolter and Grusin's study. Red vs. Blue, and much of machinima, comprises a form that does not deny its technological basis so much as deliberately and explicitly celebrate it. Bolter and Grusin seemingly anticipate this possibility:

> Computer programs may ultimately be human products, in the sense that they embody algorithms devised by human programmers, but once the program is written and loaded, the machine can operate without human intervention. [. . .] Programmers seek to remove the traces of their presence in order to give the program the greatest possible autonomy. In digital graphics, human programmers may be involved at several levels. [. . .] All of these classes of programmers are simultaneously erased at the moment in which the computer actually generates an image by executing the instructions they have collectively written. (27)

Yet, this passage reveals an important contradiction in the theory and in the medium that occasions it. Bolter and Grusin paradoxically reject authorial intent only to simultaneously reinscribe it. Human agency is not deferred in *Red vs. Blue*. Instead it is omnipresent. At the very

Volume 13, Number 3: December 2012
ISSN: 1535-0975

least, the targeting reticle on the screen serves as a constant reminder of the limits of the discursive space and of the intruding human agent within it. As well, Bolter and Grusin suggest that each successive layer of mediation attempts to mask or to render transparent the efforts of the programmers and operators who made it in the first place. They argue that immediacy generally renders the computer interface as an invisible, or an "interfaceless," interface (23). Moreover, if the logic of immediacy leads one either to erase or to render automatic the act of representation, the logic of hypermediacy acknowledges multiple acts of representation and makes them visible. Where immediacy suggests a unified visual space, contemporary hypermediacy offers a heterogeneous space, in which representation is conceived of not as window on to the world, but rather as "windowed" itself – with windows that open on to other representations or other media. (33-4)

Given the various layers through which *Red vs. Blue* is mediated, the heterogeneous space includes the game engine, its multi-player world, television (and radio, by implication), Internet message boards, and websites (and print media, by implication). Regardless of the combinations, and their predecessor media, Bolter and Grusin always stress not only the centrality of immediacy, but also the overwhelming cultural tendency to turn to hypermediation to achieve it.

I Saw You: The Case for Paramediacy

It is in terms of *Red vs. Blue*'s situation as a text representing both homage and rivalry that it steps outside the logic of immediacy as its ultimate and unavoidable aim. Although it is arguable that Bolter and Grusin overlook many forms of remediation when they suggest that the Internet remediates television, it is equally clear that *Red vs. Blue* does remediate television in several ways, including plots, familiar settings, characterizations, and its episodic structure. In

fact, the machinima makers show affinities with cult television fans, and fans of *Red vs. Blue* are even more similar to cult television fans. Here, it is worth recalling that John Fiske has described play as rooted in orientations of evasion or of resistance. This view still influences scholars and holds considerable weight among new media scholars, especially due to the influence of Henry Jenkins, one of Fiske's most notable students. Indeed, in his introduction to the recently released second edition of Fiske's *Understanding Popular Culture*, Jenkins explains not only the importance of the "textual poachers" he and Fiske celebrate, but also reaffirms the usefulness of this framework by suggesting it as a method for analyzing user-developed content (xxx). Yet, the lack of an organized politics beyond an individualized idiosyncratic act betrays the existence of different, simultaneous motives.

Thus, other scholars have situated signifying play as a postmodern strategy, as a troublesome, disruptive performative act that defies easy categorization. In their introduction to *Cult TV*, Sara Gwenllian-Jones and Roberta Pearson differentiate between that phenomenon and the more commonly studied category of the cult film. The most significant distinguishing feature of cult television is that a significantly large proportion of the viewers are avid fans and that the fans have higher visibility than avid fans of other shows. Visibility arises from the distinctive practices of cult television fans, which include the formation of loose interpretative communities and the production of tertiary texts such as fan fiction, scratch videos, cultural criticism essays, folk music, Web sites, and fan art. (xvi)

These audience practices arise from "imaginative involvement with the cult television narratives that afford fans enormous scope for further interpretation, speculation and invention" (xvi). In other words, these are neither the resistant readers Constance Penley finds among *Star Trek* slash fiction writers, nor the"textual poachers" Henry Jenkins hopefully describes. Yet,

these are still the pre-eminent and defining positions in the scholarship if only because they were among the first to map (portions of) the terrain.[6] Gwenllian-Jones and Pearson differ most starkly in arguing that cult TV, like the "vast amount of fan fiction writing, together with the production of Web sites, fan art, and the like, stems not from resistance to capitalism but rather from an imaginative engagement with cult television programs encouraged by the textual characteristic [of the form]" (xvi-xvii). This position holds when considering machinima. *Red vs. Blue*, for example, depends on, plays with, and celebrates the extensive knowledge the creators and the fans have for both *Halo* and the XBox 360 console. In terms of the audience for cult productions, David Bordwell comments, "culturalists of all stripes promote reception studies, whereby audiences are often held to appropriate films for their cultural agendas. Indeed, within the Cultural Studies position, notions of subversive film have given way to conceptions of resistant readers" (10). The notion that the text represents a site of resistance is misplaced insofar as the machinimators and their fans celebrate the very technology they are using and watching. The hypermediation of the game interface never dissolves into the immediacy Bolter and Grusin presuppose. Rather than appropriating the game, the users are actually repurposing the 3D game engine provided by the creators of the game, not only to play *Halo*, but to play with *Halo* and ultimately to play *for Halo*, or at least for the creators and owners of the *Halo* franchise. Certainly, someone could appropriate the rendering capabilities of a game like *Halo* to challenge or "to promote an alternative vision of cinematic 'art,' [by] aggressively attacking the established canon of 'quality' cinema and questioning the legitimacy of reigning aesthetic discourses on

[6]Here, it is important to acknowledge that Jenkins was among the first, and among the most prominent, scholars to consider video games as something other than a symptom—or worse—of mass cultural productions perpetuating little more than sex and violence.

movie art'" as do the "paracinematic" texts from which Gwenllian-Jones and Pearson differentiate cult television (x).[7] Simply put, *Red vs. Blue* and other machinima do not really question *any* ruling discourses. Rather, they celebrate the source text (or code) through the repurposing of the media. In fact, this is largely in keeping with the behaviours begun when games such as *Racing Destruction Set* and later *Doom* allowed players to create their own levels and, more importantly, to share these with their friends.[8]

Burnie Burns, especially, explains the motivations and goals of *Red vs. Blue* as celebratory. Among those to whom he "pays homage" are the creators of the game, with its "great visuals." To these people, Burns adds the creators and producers of other web series, most notably *Homestar Runner* and *Penny Arcade*. These series are cited during *Red vs. Blue Public Service Announcement 3*, in which the characters debate the merits of getting a tattoo. They agree that a tattoo of one's favourite character from a web series would be acceptable. Characters from *Homestar Runner* and *Penny Arcade* are offered as examples. This represents a kind of breaking of the virtual fourth wall. Similarly, the popular Warthog flip from Season One pays homage to Randall Glass and his website warthogjump.com. To make the Warthog–what Burns calls the best innovation so far in a first-person shooter–jump hundreds of virtual feet in the air, Glass carefully arranged a series of grenade explosions to propel the vehicle skyward. He recorded the

[7]Here, one must wonder about the so-called "nude raider" patches for *Tomb Raider*, which allegedly allowed for Lara Croft to play the game without her uniform of tank top and shorts. Less apocryphal is the "hot coffee mod" for *GTA: San Andreas*, an animated depiction of sexual intercourse which, though hidden, was inadvertantly—the developers allege—left in the game's source code.

[8]In this regard, fan-produced machinima has been theoretically possible for decades owing to the eventual inclusion of separate inputs for audio and video on VCRs. Even so, many audiences as recently as the turn of 21st century were confounded when I included recorded gameplay in conference presentations.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

event and put it on the web in an act that virtually says “see what I can do.” Glass has been rewarded for his pioneering efforts with guest appearances as the voice of Blue Command in several *Red vs. Blue* episodes.

Yet, it should be noted that as it exists *Red vs. Blue* is neither resistant nor tending towards immediacy. Here again, it shows affinities with the audience of cult television. Admittedly, “unlike many low-budget cult films aimed at niche audiences of aficionados, cult television is fairly mainstream fare” (Gwenllian-Jones and Pearson xiii). However, contemporary cult television shows are likely to take full advantage of the available outlets, especially the Internet, which offers rapid and easy access, which in turns facilitates connections between and among fan subcultures, well beyond those of the traditional “word-of-mouth” promotion. Clearly, *Red vs. Blue* has an available and easily tapped audience: *Halo* players. Burns explains that one of the goals for *Red vs. Blue* is to encourage other gamers to attempt to mimic the moves shown in the episodes. In the commentaries on the DVDs, they explain many of the methods used in producing the episodes. At its height, the site received over 700,000 downloads per month, and its message boards not only provide responses to the text but also suggestions for later episodes (qtd. in Whyte). Sidewinder, for instance, was added in response to viewer emails. Perhaps not surprisingly, the creators of *Red vs. Blue* describe themselves in terms not unlike those adopted by zinesters. As Stephen Duncombe has shown, the self-defined losers who produce zines actually embrace “loserdom,” but not necessarily as resistance to the dominant culture’s mythological meritocracy. Burns jokes that they are the “pompous assholes” providing the “director’s commentary also featuring Jeff.” The *Red vs. Blue* cast members frequently refer to late nights, which interfere with their day jobs, and they admit to having “played *Halo* to death.” Certainly, zines and machinima offer responses to the dominant culture, but these

Volume 13, Number 3: December 2012
ISSN: 1535-0975

responses are formed and mediated by the desire to be recognized by that culture in and through its own criteria. Machinima takes this another step by combining homage for what could be termed a technocratic innovation with the creative output of content users.

Blue Sucks: Conclusions

As much as *Red vs. Blue* subscribes to the logic of remediation—by repurposing Halo and by remediating other forms—the double logic Bolter and Grusin originally set forth is insufficient for theorizing (this variant of) machinima given its other broad attributes. As Anders Fagerjord explains, to subscribe to the double logic of remediation, "we must be convinced that there are no more logics than these two, that the two are really different, and that they are connected" (303). In fact, the two can be indistinguishable. Fagerjord concludes that "*Remediation* is a theory of the status of media, of media's different claim to *immediacy* or *reality*, and of how media respond to, redeploy, compete with, and reform other media" (304). Who, then, are the actors and where is the site of contestation? In the double logic of remediation, the actors are the media themselves. So, Fagerjord asks, "if competition among media and claims towards a 'reality' exist, these are realized in the opinions of media shared by people in a culture" (304). The limit of the theory of remediation, then, is its paradoxical treatment of reality. Bolter and Grusin's bias towards immediacy—which mirrors the bias they attribute to our (contemporary North American) culture—posits the real in terms of the viewer's experience. This renders immediacy—or transparency, or the unmediated "authentic" experience—an inherently unstable concept. The only real is (re)mediation since a receiver/consumer will have goals *other than* immediacy, transparency, or even "reality" upon occasion; less transparency might even be preferred. Regardless, "what gets in the way of finding the real is mediation" (305). Nevertheless, they do allow that sometimes "hypermediacy has adopted a

playful or subversive attitude, both acknowledging and undercutting the desire for immediacy" (34). Bolter and Grusin suggest that collage and photomontage act as hypermediated forms since they boldly appropriate and rearrange other forms and exemplify an ineluctable version of hypermediacy (39). Machinima does not necessarily aim to be transparently hypermediated. In other words, even deliberately playful hypermediated exercises remind us of the pull of immediacy by the act of resisting it; clearly a tautological argument.

Despite the suggestions of their own theoretical rigidity, Bolter and Grusin level the same criticism at scholars in related fields. For example, cultural studies scholars "often assume that these new media must follow the same pattern of hegemonic production and resistant reception. They look for examples of new media forms that can be characterized as mass media, because they are comfortable with the broadcast model in which the control of the media form is centralized" (Bolter 22). Rather than elaborate their position, then, Bolter and Grusin point out what they see as the shortcomings in other approaches. This infers that an understanding of remediation is sufficient. Stian Grogaard, like Fagerjord, questions the totalizing nature of the double logic of remediation: "Remediation is a methodological tool for a media-saturated age in which every medium is bound to interconnect [. . .] what matters is the juxtaposition of medium, whether obsolete or just hypermediated, *and* its social context. [. . .] media has colonized 'mediation' in general, since it must be tacitly understood that there is a medium for every mediation" (282). Grogaard concludes that this results in Bolter and Grusin's "bias toward immediacy, no matter how opaque or 'hyper' the medium is portrayed to be" (282). Said another way, remediation offers entry points and starting places for more site-specific types of analyses. Fagerjord concurs: "When Bolter and Grusin analyze Web media, the focus on the all-embracing double logic of remediation and its consequences for the status of new and old media obscures

Volume 13, Number 3: December 2012
ISSN: 1535-0975

the vision of remediations occurring in several directions at once" (302). In terms of reading a given text, then, remediation offers a kind of triage for unwrapping the multiple layers of form, genre, and medium. Since the theory of remediation does not fully address these multiple and simultaneous directions, it cannot encompass fully the signifying practices or the rhetoric of an intermedial production such as *Red vs. Blue*. When it remediates, machinima remediates many media. The resulting text is a tangle of remediations whose hypermediacy or immediacy is contingent not upon the media being remediated but upon the basis of production and of consumption.

Thus, it is not sufficient to adjust or to adapt the available analytical methods, nor is it necessary to focus only on rejection and innovation. It is precisely at the very moment when the user becomes creator that the need to construct other theories and methods emerges most clearly. In the case of computer games, Gunnar Liestol identifies several important aspects that cannot be accounted for adequately with "traditional, established humanistic perspectives: textual analysis has not, prior to the emergence of digital media, occupied itself with readers or viewers who actively manipulate the material existence of the textual object. Manipulation and feedback, however, are central features of the relationship between digital media texts and users" (393). In part, *Red vs. Blue* works because it has the faceless characters of *Halo*. One of the most frequently cited challenges the producers explain is the head-nodding that serves as a signal for speech. It must be negotiated with the idle function of the character doing the "filming." They estimate that as much as "90% of the effort" arises from trying to have the characters "hit their mark." The faceless characters allow for creativity not necessarily possible with established and more developed characters such as Lara Croft or the squad in *Gears of War*. The characters of Donut, the pink one, and Tex, the female who loses her voice box, highlight this aspect of the

Volume 13, Number 3: December 2012
ISSN: 1535-0975

productions.

As well, there are omnipresent reminders of the interface, which further highlight the intersection of, and even the blending of, technical and creative aspects specific to the form as it currently exists. In *The Language of New Media*, Lev Manovich dismisses the concerns of critics regarding interactivity because "to call the computer 'interactive' is meaningless—it simply means stating the most basic fact about computers" (55). However, as Bolter does point out, the shift "from consumption to production should matter to cultural theorists [. . .] As a consumer, one can only redirect the intended effects of media artifacts, but as a producer one can change the artifacts themselves" (27). This is what machinima accomplishes. The interactivity of the *Halo* engine is significant and worth mentioning because it provides the point of contact between the two media. None of this would be possible without the interface and the producers and viewers take pleasure from that fact. However, the point of contact is not the hallmark of immediacy that Bolter and Grusin suppose but is instead an always already reminder of *Halo* for the sake of reminding us of *Halo*, at least in the eyes of the creators and many of the viewers.

Thus, Bolter's words serve as a call to educators to remind our students that the act of reading is just that: an act. This is to say, the status of the author and of authorial intent seems to change in the process of reading the game, making machinima, and reading the combined product. Readers make texts, but only within the rubric of a pre-existing model and only in furtherance of that model, its goals, and its aims. Like fan-fiction writers, but also akin to skateboard video producers, part of the project of machinima *writ large* is to be discovered, to become part of the officialdom of the franchise, and to gain entry into the profit-making machinery of the game industry. Indeed, *Red vs. Blue* eventually became just another product of the corporation that owns the *Halo* franchise. This acknowledges and reinforces capitalist motives as rationale and as

Volume 13, Number 3: December 2012
ISSN: 1535-0975

outcome for a supposedly creative endeavour. It also constrains and even forecloses potential readings of the text. This is not a circuit of culture, or the cultural change that Fiske, Jenkins, and others laud. Instead, it is a clear indication that consumer and late capitalism are so thoroughly imbricated and naturalized with contemporary culture as to be completely and utterly immanent. Commodification appears to be the only measure of success and of a product's legitimacy, or authenticity, as an artefact. Indeed, it is arguable that commodification is the only measure, criteria, and outcome.

It is crucial, then, that educators recognize and grasp the opportunities that machinima, along with other digital media, presents lest the pedagogies rest solely in the hands—and in the pocketbooks—of corporate entities. First and foremost, there does exist a democratizing potential since the technology is relatively inexpensive and accessible, at least in comparison to the wifi networks, touch boards, and tablet computers being hailed as necessary for current and future student success in any classroom, not to mention the cameras, editing suites, lighting, and other equipment associated with traditional film and video production. Here, educators need to acknowledge and to overcome critical commonplaces, and even phobias, regarding computers and video games, while embracing the likelihood of students being more fluent and more comfortable with the technology. In this regard, it is well worth mentioning the ongoing debate regarding the so-called crisis in boys' literacy. While space does not permit a detailed discussion of this debate, it does bear consideration. Given that boys still play video games more frequently than girls, this technology affords educators a ready and accessible means of engaging these students.

At the same time, a number of established practices highlight the opportunities for engaging students by integrating them with machinima. For example, the common "Reader's

Theatre" exercise, in which students engage in the (unstated) act of intertextual readings of a given text by combining passages from the text with passages from other stories, song lyrics, movie and other quotations, and/or images, immediately comes to mind as on that could be performed in and through machinima.. The intent is to show that any text is related to other texts, that meaning is provisional, and that the reader is involved in that process. Similarly, many popular curricular aids include related activities, such as reading and producing graphic novels, storyboards, public service announcements, and zines.[9] Machinima offers a means of combining these activities to allow for an integrated approach to learning. Moreover, component pieces such as flow-charts and *mise-en-scène* composition, as well as the actual creation of the scenes, as in a common "Story Theatre" exercise, which asks students to envision and to enact particular episodes in texts, should help to demystify video production, among other curricular aims. In this regard, one of the challenges of teaching students to read film, television and other visual media is the tendency to dismiss or to ignore the editorial component of a given shot in favour of the belief that scenes simply "happen" thanks to the mere presence of a camera. Machinima, then, can be a preferable alternative to contemporaneous technologies such as *Shakespeare in Bits*. Rather than engaging in the act of reading, these "apps" represent several lamentable trends, including an obvious reification of the text, an emphasis on commercialization, a tendency to equate copying with learning, and an emphasis on "looking up" information rather than developing knowledge.[10] None of this is to idealize machinima in the way that Fiske and Jenkins

[9]In my home province of Ontario, for example, educators are encouraged to use the provincial education ministry's *Think Literacy* resource, which is available online in a series of pdf files. The resource contains sample handouts to aid in preparing these texts.

[10]I consider this last aspect of technology in the classroom in greater detail in "'Veni, Vidi, Wiki': Expertise as knowledge and a technocratic generation" (*Reconstruction: Studies in*

Volume 13, Number 3: December 2012
ISSN: 1535-0975

famously envision, for example, the idiosyncratic wearing of a pair of blue jeans as an act of opposition to the dominant culture. In this view, manipulating the tools of the dominant becomes a form of resistance. The lesson of *Red vs. Blue*, and its complete, utter and hoped for co-optation, stands as clear evidence to the contrary. However, the teaching and the comprehension of the literacies involved in these manipulations reveal the underlying structures in the creative and in the commercial process. Contemporary curriculum documents stress the need to empower students by making connections among media and texts and by fostering multiple and simultaneous media literacies.[11] Understanding machinima production, distribution, and consumption through its remediation of texts and media provides an experiential and kinesthetic means of achieving that goal, provided educators remain vigilant of the social, political, cultural, and economic ramifications of such an exercise.

Contemporary Culture 10.2, 2010).

[11]In Ontario, for example, teachers are reminded that *every* teacher is a literacy teacher.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

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Descriptive Observations of Ebook Shared Reading at Preschool

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Abstract

Using a descriptive research design, this study examined the implementation of ebook shared reading in eight preschool classrooms located in two different regions of the United States. Observations focused on teachers' implementation of a vocabulary focused shared book routine, language strategies at the touchscreen, mobile devices to extend the shared reading experience, and children's learning of target words. Participants included a diverse sample of 28 children and 8 teachers. Following a brief training, teachers conducted 8 ebook shared reading sessions (2x per ebook) over a 4-week period at the touchscreen; children browsed or reread stories on a mobile device (iPad or iPod). Video observations, totaling 274 minutes, were analyzed for fidelity of basic shared book implementation, teachers' language modeling and children's use of target words. A pre/post informal curriculum based measure was used to assess target word learning. Results suggest a relatively easy transition from traditional to ebook shared reading that may support children's word learning, but may not maximize the potential of ebooks for instruction and independent reading. Research on instructional techniques and strategies that maximize ebook features and support ebook browsing/reading on mobile devices is needed.

Key Words: early literacy, ebooks, shared book reading, digital reading

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Publishers of children's books and early reading programs offer an increasing array of ebooks for young children, not to mention a burgeoning 'app' market for iPads, iPods, Nooks and Kindles. In general, the ebook market is escalating with sales increasing 139% in 2010 (Association of American Publishers, 2010) and circulation of ebooks at school libraries reaching a tipping point in relation to traditional books (Library Journal/School Library Journal, 2010). Ebooks, it seems, are everywhere.

From an educational perspective, ebooks have their pluses and minuses – particularly when it involves literacy instruction. On the down side, studies of ebook design show that children's *first* ebooks are mediocre at best, offering low level multimedia, interactivity and literature (deJong & Bus, 2003; Authors, 2009a; Authors, 2009b). On the up side, though, well-designed ebooks with rich visualizations, sounds and music appear to support language, literacy and comprehension, especially for young students at risk (Zucker, Moody & McKenna, 2009). The ebook, in sum, promises a new potential for emerging readers.

For educators the bright promise of ebooks poses some critical pedagogical questions: What role will ebooks play in early literacy instruction? What does effective instruction with ebooks look like? How will they 'fit' into the classroom environment? Presently there are very few (if any) articulated models of early literacy instruction using ebooks, nor is there much research-based guidance on how to use these 21st century readers to promote the early literacy knowledge, skills and motivations of young children. Descriptive research can help to lay the groundwork for more controlled studies that examine the instructional effectiveness of ebooks at the onset of the learn-to-read process.

Ebook Pedagogy: What We Know So Far

The transition from print to digital books occurred late in the 20th century with ebooks for young children entering the CD-ROM market in the early 1990s. Several lines of

Volume 13, Number 3: December 2012
ISSN: 1535-0975

research ensued with the goal of examining the qualities of ebooks and their impact on early literacy experiences. To clarify terms, an ebook is any digital learning object that represents what would generally be considered a traditional children's literature book. These digital learning objects can come in many different shape and sizes, files and formats. They can be designed specifically for use on a mobile device, such as a tablet or cell phone, or may be more broadly accessed via web browser across multiple platforms and devices. The standard purposes of telling a story, explaining a concept, or presenting ideas through a digital text format is at the core of all ebooks. In the move towards digital books, we see a wide array of ebook design that range from static ebooks (pdf; epub), media ebooks (web and mobile apps with audio and/or video) and interactive ebooks (mainly mobile apps). For purposes of this paper, we define ebook as a digital book that includes static ebooks (pdf; audio), media ebooks (web apps) and interactive ebooks (mobile apps).

The Ebook as Storybook

At the heart of early literacy experience is the storybook, which marks the young children's entrée into literacy around the world. Its powerful role in literacy development is well documented in family literacy and early education (e.g., Wasik, Dobbins, & Herrmann, 2001). A staple of the bedtime (or nap) routine, the storybook shared between adult and child mediates what Don Holdaway (1979) decades ago referred to as an emerging literacy set: high expectations of print; models of book language; familiarity with written symbols; print conventions; listening skills; and de-contextualizing abilities (e.g., imaging). Subsequent research supports the claim that storybook reading substantially prepares children for the learn-to-read process, developing their print knowledge, comprehension strategies and vocabulary (Bus, 2001; Senechal, 1997).

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Building on this line of inquiry, researchers have examined the ebook as a mediator of emergent literacy skills. Hassett (2006), among others (e.g., Smith, 2001), argues that the combination of sound-print-image used in ebooks yields a new form of representation that makes new demands on emerging readers that go beyond decoding the text. The young reader needs to learn how to negotiate a non-linear, multi-layered reading environment that involves new kinds of search strategies (e.g., click and scroll); new kinds of meaning sources (e.g., graphics and type-set); and new forms of meaning making (e.g., active play with texts). In general, studies show that these signature characteristics of ebooks—visual, sound animation and music effects—do not interfere with emerging literacy skills, and in fact may be promoting skill development for some children, especially those with linguistic delays (Bus, Verhallen, & de Jong, 2009).

But what does adult-child interaction at screen with an ebook look like? In a short term case study with her two-year-old grandson, Labbo (2009) describes how he gradually assumed more responsibility for navigating and telling the story over ten read alouds during a 3-month period. He began to anticipate the story line, comment on screen content, and 'play out' the story with his Elmo stuffed animal. The rich description of this case study corroborates related research, which suggests that children benefit from the simultaneous presentation of visual, audio, and print information in making sense of complex messages and story lines (Desmond, Singer, Singer, Calam, & Coalimore, 1985; Verhallen, Bus, & de Jong, 2006).

The eBook as Learning Object

Few studies have directly examined the internal instructional design of the ebook as a literacy learning resource for young children (Authors, 2010a), although studies focused on

Volume 13, Number 3: December 2012
ISSN: 1535-0975

literacy development have peripherally observed design problems. Labbo and Kuhn (2000), for example, commented on the need for better designed digital conventions (e.g., pop-ups) to produce more considerate text that supports comprehension. Examining ebooks as educational tools in kindergarten, Shamir and Korat (2009) identified several high level design features relevant to young learners, such as (a) oral reading with text highlights that illuminate the nature of print (e.g., word boundaries); (b) hotspot activation aligned with text; (c) a dictionary option that allows repeated action by the child; and (d) a game mode separate from text mode. More specific testing of ebook design elements reveals that both dictionary hotspots and multiple choice questions strategically placed in the story line benefit word learning; however, vocabulary interruptions in the form of multiple choice questions proved more beneficial than just providing a definition or synonym of the word in a hotspot without a question-format, especially for learning novel words (Smeets & Bus, in press).

The Ebook in the Classroom Environment

Relatively little is known about the impact of ebook-related instructional technology, such as touch screen computers, interactive white boards, and mobile devices, on the arrangement and allocation of classroom space, although it is well-established that physical environments have a profound effect on what young children think, do, feel, and learn (Moore, 2001; Weinstein, 1979). In an electronic age, the goal is to weave ebook browsing and reading into already well-designed physical learning spaces of the classroom, and not to isolate this way of reading from traditional book reading areas, such as the book corner or library center (Lackney, 2003). Several basic principles of classroom design apply, such as ensuring sufficient space for activity in well-lit, low traffic areas that are comfortable and appealing (Moore, 2001; Olds 2001).

Volume 13, Number 3: December 2012
ISSN: 1535-0975

When educators begin to blend physical, digital, learner and play spaces together, the overlap opens up new arenas for innovation, referred to as “edges” or "peripheral areas with high growth potential" (Hagel, Brown & Davison, 2009). We have identified the eBookNook as an edge where the traditional “book corner” and digital media merge to provide teachers and young readers with new literacy learning opportunities with multimedia. Our design research suggests five criteria for supporting ebook reading experiences in an eBookNook (Authors, 2011b): (1) clearly defined locations; (2) clear signage using print and picture; (3) inviting space with appropriate heating, light, color, and graphics; (4) low external sound levels; and (5) several power outlets and adequate Wi-Fi access. In classrooms with well-defined and appealing eBookNooks children appear actively engaged with ebook browsing and reading in shared reading with the teacher at touch screens and on their own or with friends using mobile devices (Authors, 2011c).

Description of the Study

In this study we observe vocabulary instruction in the context of ebook shared reading toward the goal of better understanding ebooks as an instructional resource in early literacy curriculum. Using a descriptive research design, we examined the implementation of ebook shared reading in eight preschool classrooms participating in federal funded Early Reading First programs (2001). To explore the impact of instruction in the ebook setting, the observational focus was on word learning given the significance of vocabulary in learning to read and later reading comprehension (Hart & Risley, 2003). The study was guided by several broad questions:

(1) To what extent do teachers implement a shared book routine using ebooks at touch screens?

Volume 13, Number 3: December 2012
ISSN: 1535-0975

(2) To what extent do they use language strategies to support word learning with ebook devices?

(3) To what extent do children engage in word learning with ebook devices?

(4) Do children benefit from vocabulary instruction in shared reading with ebooks?

Participants

The sample included 28 children and 8 teachers in preschool classrooms located in the Midwest and Southwest sections of the U.S. (4NE; 4SW). Demographics of the sample are summarized in Table 1. The child sample was diverse including (18% Hispanic; 29% White; 49% African American); included an even mix of boys (n=17) and girls (n=11) and involved children in the average range of the PPVT-IV, with the exception of 9 children with special needs. The teacher sample was also diverse and included four teachers with AA degrees and four with BS or higher degrees; the group averaged 13 years of preschool teaching. All had participated in substantial professional development in evidence-based early literacy instruction as a part of the Early Reading First program (est. 100 hours per year).

Classroom Site	Teacher		Child Sample	
	Education	Years of Experience	Mean Age in Months	Mean PPVT-4
Midwest 1	AA ECE	16	52.43	82.67
Midwest 2	AA ECE	26	49.6	97.25
Midwest 3	AA ECE	10	57.11	110.33
Midwest 4	AA ECE	14	56.43	102.75
Southwest 5	BA-EL	14	54.42	75.33
Southwest 6	M.ED-SPED	25	58.49	84.25
Southwest 7	BAE-SPED	2	52.52	87.25
Southwest 8	BAE-SPED	3	55.49	82

Table 1: Participant Demographics

Procedures

Prior to the implementation of ebook shared reading sessions, eBookNooks were

created in each of the eight classrooms using design criteria developed in an earlier study (Authors, 2011b). Spatial arrangement of book-nooks was designed to accommodate up to five children, and included a touch screen computer (table top or wall-mounted), comfortable seating, proper acoustics, signage, and appealing graphics. Most book-nook settings were located near the traditional book corner of the classroom. (See Figure 1.)

Figure 1: eBookNook Design

Based on research, key features of effective vocabulary instruction were identified (Silverman & Crandall, 2010) and embedded in the before-during-after framework of traditional shared reading (Holdaway, 1979; Mason, Peterman & Kerr, 1989). (See nine step protocol in Appendix A.) Target words, for example, were introduced, defined and repeated throughout the storybook reading session. Children were encouraged to say and discuss new words in context, to use gestures that helped them to remember word meanings and to connect words to their prior experience. Additionally, with the exception of one classroom, children browsed and reread ebooks stories on their own or with a friend using either an iPod or iPad mobile device.

Teachers received training via a web-based tutorial that introduced ebooks, explained operational basics, highlighted design features (e.g., hotspots) and provided an instructional

Volume 13, Number 3: December 2012
ISSN: 1535-0975

framework that emphasized vocabulary instruction (est. 90 minutes). During implementation they prepared lessons for ebook shared reading sessions each week and were coached periodically by Early Reading First staff to ensure fidelity to the basic instructional framework. (See lesson planning form in Appendix B.)

Shared ebook reading sessions occurred over a 4-week period during which teachers presented a total of four ebooks, viewing each 2x per week (read 1; read 2) and teaching a total of 40 new words over the time period. (See Appendix C.) After viewing/reading each ebook twice, children in all but one classroom browsed or reread stories on a mobile device, usually toward the end of each week. Thus these children were exposed to each story 3x in a one-week period: twice with the teacher and one time on their own or with a friend.

Data Collection

During the 4-week implementation, video observations were captured from two devices. An external USB webcam/microphone (Blue Microphones Eyeball 2.0 HD Audio and Video Webcam with Microphone) was used to capture video of the children's behaviors. Digital cameras with built-in microphones were used to capture teacher instructional behaviors. Cameras were mounted on tripods and positioned in the rear of the eBook Nook, allowing a detailed capture of instruction and mobile device reading. The teacher or coach would set the Webcam up to record, starting and stopping the recording through software on the touch screen computer; the coach would set-up the rear camera and record from that view. Each shared reading session included a set of video files for each teacher: 2 files from read 1; 2 files from read 2; 1 file from the iPod or iPad browsing/reading (if available). The video capture generated a total of 156 video files. An external hard drive was used to harvest the source video from the Asus Touchscreen PCs and from the digital cameras; files were

Volume 13, Number 3: December 2012
ISSN: 1535-0975

transferred to an encrypted storage space for access by the research team for coding purposes.

To gauge children's word learning across the 4-week implementation, their knowledge of the target words was pre/post-tested on each ebook using a curriculum-based decision-making measure (CBDM) that consisted of two assessment tasks: (1) Show Me (receptive vocabulary) which asked children to point to a stated word in a 4-photo panel and (2) Tell Me (expressive vocabulary) which asked children to name a specific photo in a 4-photo display. Both Show Me and Tell Me tasks included 10 words each for a total possible score of 20. Curriculum-Based Decision Making (CBDM) has proved effective for assessing young children's early literacy skills including letter naming and sounds; receptive and expressive vocabulary; alliteration and rhyming (Ergul, Burstein & Bryan in press).

Data Analysis

We used a sampling procedure for analyzing video observational data at 1-minute intervals. A total of 16 ebook shared reading sessions, counterbalanced for first and second viewings each week, constituted the sample, representing 25% of the instruction over the 4-week period. These observational data totaled 274 minutes (147 minutes shared ebook; 127 minutes mobile) and were entered into NVivo 8, a qualitative software program, for analysis based on a coding procedure developed in an earlier study (Authors, 2011c). Early Reading First staff blind to the study reviewed and coded the video observation sample for fidelity of implementation and teacher and child language. Fidelity of implementation was determined based on the extent to which the teachers implemented 8 of the 9-step protocol that represented essential before-during-after instructional interactions. We eliminated step 9 (*prepare for mobile reading*) because this step often occurred on a day/time separate from the shared ebook reading session or was not implemented.

Teacher language was coded in six categories found to support word learning in storybook reading (Wasik, Bond, & Hindman, 2006): directing, explaining, extending, providing feedback, questioning and supporting peer conversation. (See Table 2.) In addition, teachers' weekly lesson plans (at least one plan per teacher with the exception of two teachers) were collected to supplement the video observations. Child language was coded for instances of pronouncing, saying, or using target words during shared ebook sessions and with mobile devices. Target word learning was pre/post-tested for each shared reading session using the CBDM measure.

Language Type	Definition	Example
Directing	Ask/guide children	Say *privacy*.
Explaining	Clarify by providing more details	*A porcupine is an animal covered with sharp quills*.
Extending	Elaborate on the explanation/ definition	*Sometimes we put flowers or books on a shelf.*
Feedback	Respond/react to a child's comment	C: *1200* T: *Well, 1200 is an even bigger number.*
Questioning	Ask/inquire of the children	*What do you think the girl means when she says "Monkey see, monkey do?"*
Conversing	Encourage children to talk to one another	*Tell your friend Jerel about the picture.*

Table 2: Teacher Language Categories

Results

Teachers' Implementation of a Shared Book Routine

With the exception of viewing/listening with the children rather than reading a 'book' to them, ebook shared reading affords an instructional setting similar to traditional storybook reading. It should include, therefore, strategies that engage children before, during, and after reading, and that support learning essential literacy skills. In this study, teachers were guided

to implement shared reading using a basic before-during-after routine and to teach target vocabulary words in the story context. The extent to which they implemented essential instructional steps over the 4-week period in the ebook setting is summarized in Figure 2. Early Reading First staff rated a sample of video observation for fidelity to each of the eight steps in the protocol by assigning either a 1 for implementation or a 0 for lack of implementation.

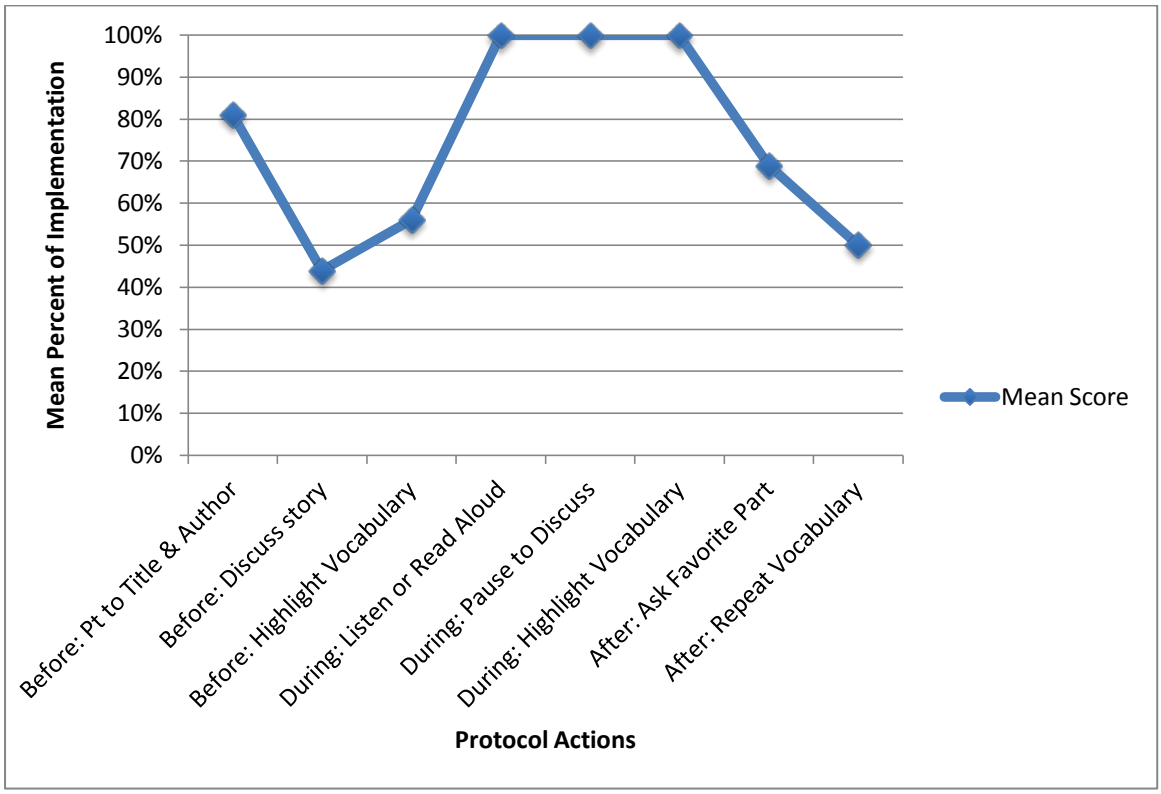

Figure 2: Mean Fidelity to Shared Book Routine

In brief these data show overall fidelity at 75% of the routine, indicating that the teachers adhered to a basic instructional framework fairly consistently across the implementation period. Fidelity was highly consistent during the ebook reading (100%) and less consistent before and after reading (about 60% of the time). The less frequent attention to vocabulary before (about half the time) and after reading (again, half the time) is notable because it

impacts amount of exposure to target words.

Teachers' Language Use to Support Word Learning

A solid body of research shows that adult-interruptions while reading to highlight and discuss vocabulary words that children may not know increases their chances of learning and remembering new words (Biemiller & Boote, 2006; Justice & Ezell, 2002; Silverman, 2007). Several language facilitation strategies have been found to be especially effective, such as explaining what words mean in the story context (Coyne, McCoach, Loftus, Zipoli, & Knapp, 2009; DeTemple & Snow, 2003). The mean frequency of teachers' language strategies to support word learning across stories and devices is displayed in Figure 3.

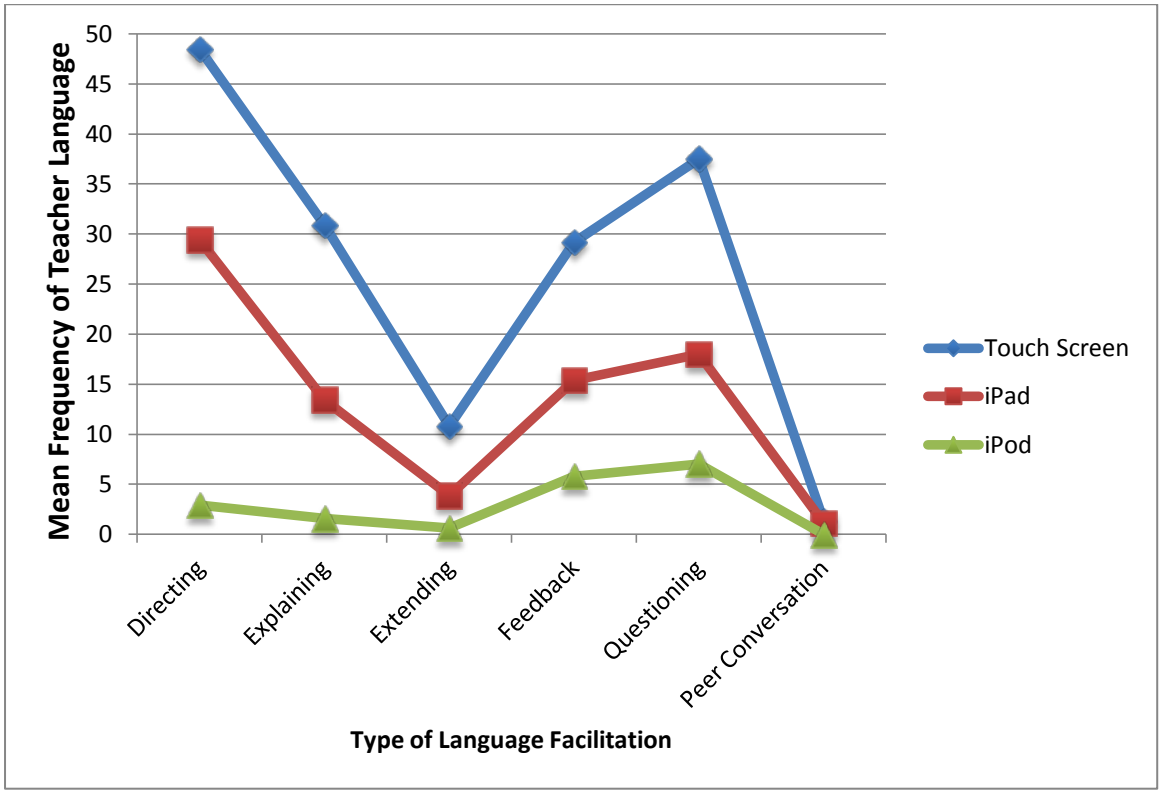

Figure 3: Mean Frequency of Teacher Language Use by Type and Device Over All Sessions

Most of the teachers' language facilitation occurred at the touchscreen followed by the iPad and the least with the iPod. Directing the children's attention to new words was the most

Volume 13, Number 3: December 2012
ISSN: 1535-0975

used strategy with the exception of the iPod setting where asking children questions about what they were viewing and providing feedback appeared to work in tandem. At the touchscreen, teachers tended to direct attention to words, ask questions, explain, and provide feedback about new words offering few extensions and allowing very little conversation among children. This pattern resembles that frequently observed in traditional storybook reading where teachers, more or less, point out new words, ask children questions about words, provide definitions, and offer feedback on pronunciation and word meaning (Silverman & Crandall, 2010).

Language facilitation with iPads generally follows a similar pattern, which suggests that this mobile device appears to afford instructional talk more so than the iPod where instructional talk appears to drop rather dramatically. Across all settings, teachers' use of an extending strategy was quite low, thus they did not elaborate very much on word meanings nor did they encourage children to engage in peer conversations about words. Given the children's age (4 year-olds) and the time limitations for read aloud sessions in classrooms, the lack of peer conversation is perhaps to be expected. The limited use of teachers' use of the extending strategy in ebook shared reading, especially at the touchscreen, however, is problematic given its importance in strengthening children's understandings of novel word meanings (Senechal, Thomas & Monker, 1995).

Children's Use of Target Words

A critical feature of storybook reading is the opportunity for children to say and use words that may be new to them. Shared reading of big books, little books and ebooks should create conditions for children to rehearse and use new words (Penno, Wilkinson, & Moore, 2002; Senechal, 1997). Evidence of children's use (i.e., pronouncing, repeating, defining) of target words across sessions by device is shown in Figure 4.

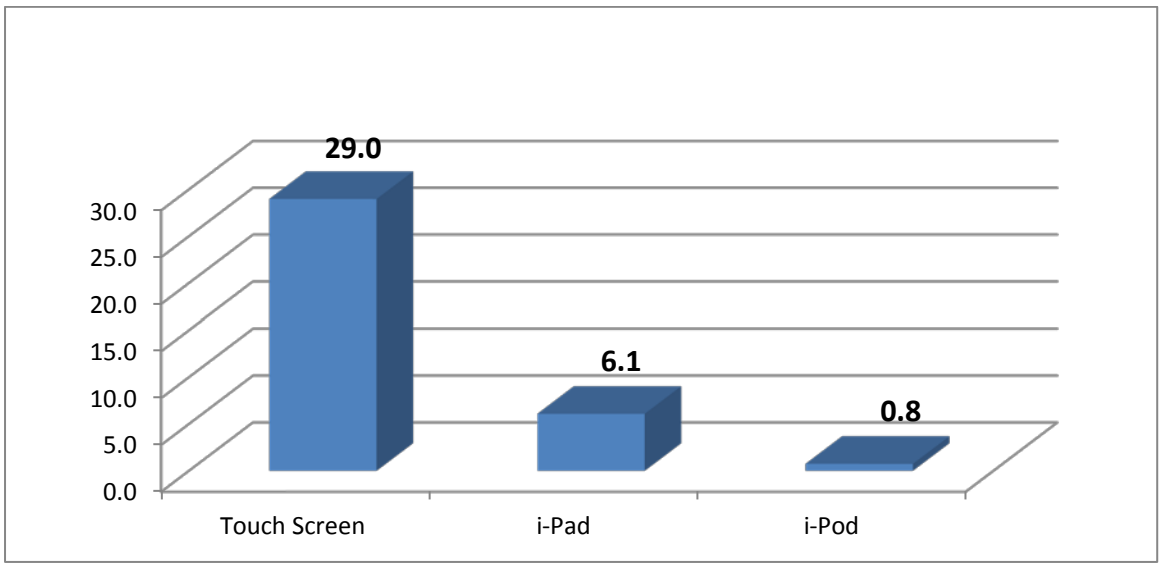

Figure 4: Average Frequency of Target Words Spoken by Children Across Sessions By Device

The bar graph shows that children (in aggregate) orally pronounced the target words about 30 times on average when at the touch screen as compared to six times when using the iPad and rarely, if at all, with the iPod. This is to be expected given the shared reading routine used by the teacher at the touchscreen which prompted children to say and define target words. Granted, too, these data present a gross view of word use, since some children may have spoken a lot and others very little, if at all. That the children did not utter the target words very often, however, does not necessarily mean they were not processing them. Some recent research, for example, suggests that oral pronunciation may not be critical to word learning from interactive digital books (Smeets & Bus, in press). Even though the children, here, were not orally saying the target words they may have been mentally rehearsing them, especially when using the mobile devices.

Figure 5 provides another cut on children's word usage, showing the variations by classroom location (SW classrooms 1-4; MW classrooms 5-8). (Note: SW classroom 2 did not implement use of the iPad or iPod.) In general, children in the Southwest classrooms

tended to use target words more frequently than those in the Midwest classrooms. Those children in classroom 4 (SW) verbalized the target words the most while those in classroom 6 (MW) did so the least. We see a similar pattern in children's word usage with mobile devices; children tended to verbalize target words when using iPads or iPods more often in the Southwest classrooms (1, 3, 4) and less so in Midwest classrooms (5-8). In two of the Midwest classrooms (5, 6) children did not say the target words at all.

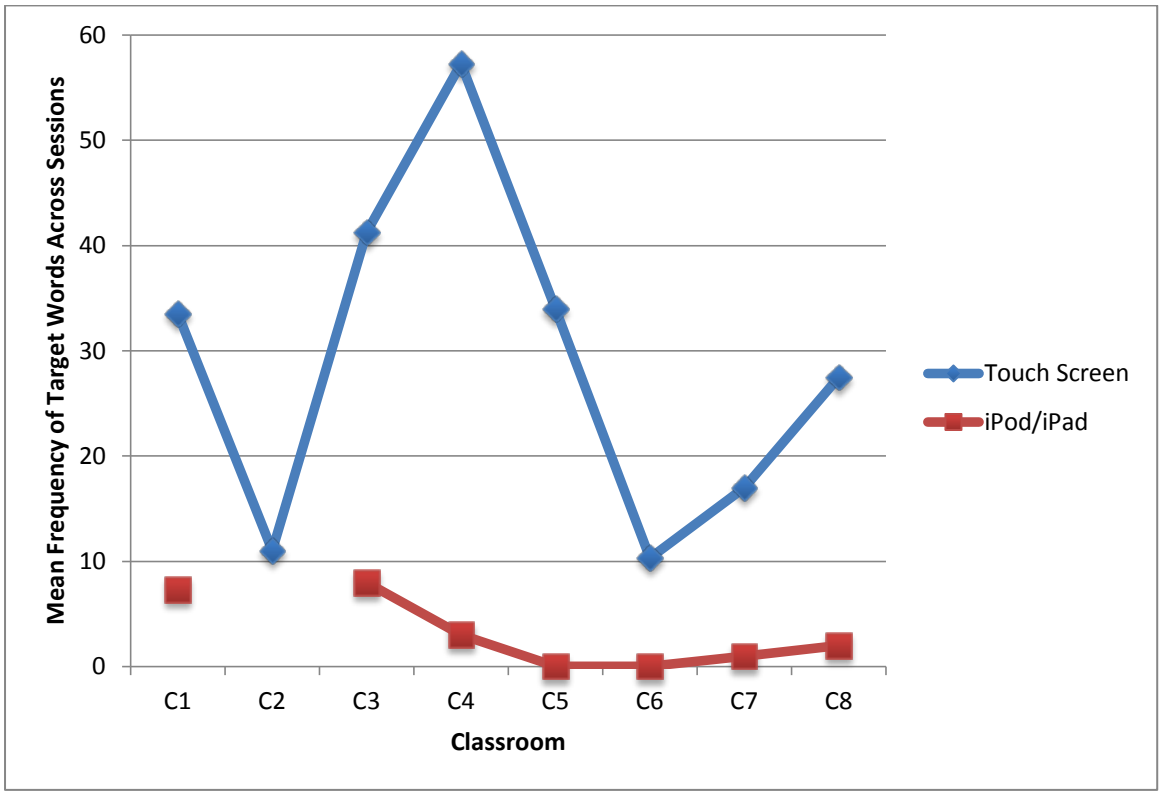

Figure 5: Average Frequency of Target Words by Children by Classroom and Device

In brief, these descriptive data suggest the potential influences of device and teacher variables on children's opportunities to learn new words from ebooks. The touchscreen setting, for example, was more structured in that it was teacher-led, involved groups and followed a basic shared book routine whereas the mobile settings were less structured, allowing children to browse and read on their own with minimal teacher facilitation. Of the

two mobile settings, the iPad seemed to elicit more oral pronunciation of words than the iPod. To be expected, individual teacher variation also influenced children's use of target words with some teachers creating more opportunities within the instructional routine for children to verbalize target words than others. That this a necessary condition for learning new words, however, is open to question. Children may learn new words without necessarily pronouncing them (Smeets & Bus, in press).

Children's Learning of Target Words

A critical goal of a shared reading approach is the development of early literacy skills that lay the foundation for learning to read. In this study we explored the potential of ebook shared reading for influencing children's learning of target words in stories that might contribute to their vocabulary store. Our preliminary results are positive suggesting that the children did learn new words over the short term. (See Figure 6.)

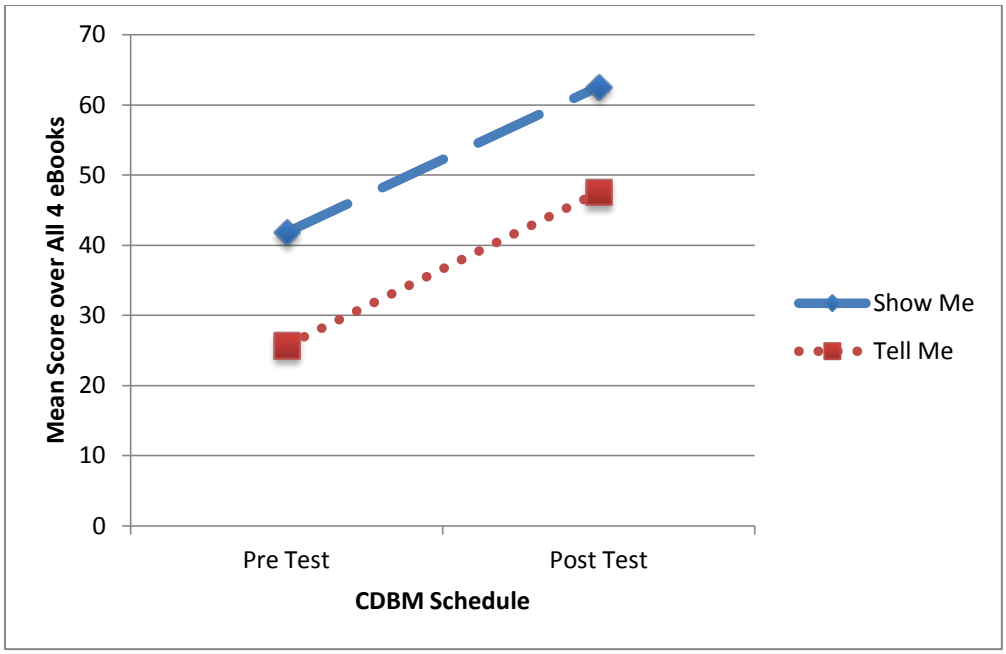

Figure 6: Pre and Post Test CDBM Results Across All Four eBooks

Children were exposed to a total of 40 target words over the 4-week period.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Aggregating mean scores from pre-post-tests on each book (10 words each), the children knew 34% of the target words (about 7 words) prior to shared ebook reading and 55% (about 11 words) following the set of sessions which shows a gain of 21 percentage points (about 4 words). This translates to about one new word per week added to the children's vocabulary.

There were no substantive differences in pre-post-test results by type of vocabulary knowledge (receptive; expressive), although children started out with proportionally fewer target words in their expressive (26%) than their receptive vocabulary (42%). Children made comparable gains of about 2 new words over the four weeks in each mode. This is notable, since children tend to gain fewer words expressively than receptively in shared storybook reading (Senechal, 1997).

Discussion

This study explores the ebook as an instructional resource for shared reading in a small sample of Early Reading First preschool classrooms. Following an orientation and training on operating, noting design features and using ebooks for instructional purposes, teachers implemented a vocabulary-focused shared book routine using ebooks at touchscreens with small groups of children in eBookNook settings. Results showed adequate fidelity to vocabulary instruction in a basic before-during-after routine; language modeling consistent with traditional shared book reading; device and teacher variability; and evidence of children's word learning.

From these results several descriptive observations emerge that inform ebook pedagogy. First, it appears that the transition from traditional to digital shared reading is not too difficult, as teachers readily implemented a familiar BDA routine with ebooks at the touchscreen. As they viewed/listened to ebook stories with children, they implemented key instructional steps with fidelity a majority of the time, thus creating learning opportunities not

too different from those in traditional shared book reading (e.g., Big Books). In this instance, the known of *shared book* practice appeared to support and structure shared reading in the relatively unknown reading environment at screen.

The data also suggest, however, that this transfer may be a 'package deal' in that it includes not only fidelity to extant practice (for the most part), but also habits of language modeling that may more or less support word learning from books. These teachers, for example, preferred strategies of directing, asking questions, and explaining new words over extending word meanings or engaging children in conversations about words--strategies they likely know and use with traditional books. They did not, however, adapt their instruction to capitalize on the unique media qualities of ebooks (e.g., music; illustrations; animations; hotspots) found to improve conditions for word learning, such as linking sensory information to word meaning, talking over animations to explain them, exploring the content of a hotspot, or interrupting to explore, categorize and/or connect words to children's experience (Shamir & Korat, 2009; Smeets & Bus, in press}. Thus while the structural similarity between traditional and ebook shared reading may present a pedagogic advantage, it also may create a blind spot to the unique features of ebooks that might enhance word learning. Moreover, it may facilitate transfer of ineffective practices to a new (and potentially rich) learning environment with ebooks.

Second, the results highlight differences between ebook reading at the touchscreen and with mobile devices relevant to an ebook pedagogy. In brief, structures and strategies around child-led ebook browsing and reading with mobile devices appear less developed than those at the touchscreen. While implementing a shared book routine at the touchscreen setting (teacher-led, small group interaction) functioned rather smoothly for these teachers, how to facilitate children's engagement with ebooks on mobile devices (child-led, individual/pairs

Volume 13, Number 3: December 2012
ISSN: 1535-0975

interactions) appeared more problematic as suggested by the low levels of teacher language in these settings. Perhaps seen as a time for independent book browsing and reading (a common 'on the rug' practice in many early childhood classrooms), opportunities to encourage, prompt, extend, and converse about the ebook content and words were overlooked. Left to their own devices, children will explore and learn from ebooks, but they also can quickly lose their sense of purpose, lapsing into frivolous, aimless activity. Teachers may need more guidance here about how to maximize ebook browsing/reading with mobile devices in ways that support instructional goals. Further research is needed to generate, develop and test vocabulary instructional techniques specific to ebook design. Techniques, for example, that connect vocabulary highlighted in ebook shared reading to independent ebook browsing are needed; also how to use media elements, such as music, animation, hotspots and graphics to full advantage when teaching new words would be helpful.

Third, the results point to the promise of ebooks for supporting word learning in the preschool classroom. Even with brief exposure to a set of target words, children made gains in both their receptive and expressive vocabularies. The ebook, therefore, may extend the opportunities for word learning in the early literacy curriculum. Along with traditional shared book reading and read aloud activities, teachers can use ebooks to further expose children to vocabulary words.

Limitations

There are several limitations to this study that need to be taken into account when interpreting the results. First, it was conducted in Early Reading First classrooms, which adhere to a scientifically based early literacy curriculum focused on essential skills and this orientation may have influenced the shape and direction of the ebook shared reading experience. Less prescribed curricular approaches to digital reading likely have different

Volume 13, Number 3: December 2012
ISSN: 1535-0975

effects on children's experience, emphasizing different reading behaviors and skills that contribute to vocabulary growth (e.g., listening comprehension). Additionally the study relied on convenience samples of small sizes within a few select Early Reading First classrooms, further compromising the generalizability of the results. Formative studies involving a broad range of Early Reading First program classrooms with larger samples would provide richer descriptive information as the foundation for hypothesis-generation and testing. Also, teachers did not implement the protocol to a high degree (<80%), which may have had a bearing on the opportunities for word learning in the electronic environment. Further teacher development and training appear necessary to maximize the potential of ebooks for shared reading, especially for children with vocabulary delays. The completeness of video capture was also an issue and relevant video data may have been lost at the outset and not included in subsequent analyses (e.g., language use), thus impacting the results. Future studies should strive to widen the settings and samples, emphasize instructional techniques unique to ebooks and improve video-observational techniques to capture rich descriptions of ebook shared reading in the preschool classroom.

Conclusion

Over time, each emerging and new technology/curricular resource is accompanied by a pedagogy, or set of practices, that attempts to maximize its instructional use with learners. The medieval-age hornbook called for instructional techniques and strategies that emphasized pronouncing letters and sounds correctly and articulately. Teaching, therefore, focused on recitation. The basal reader system led to a host of oral and silent reading teaching techniques collapsed into the directed reading lesson, which consisted of multiple steps (and workbooks for practice). The Big Book introduced the idea of collaborative or shared reading, neatly summed in the Read To, Read With, You Try procedure; it also emphasized after reading

Volume 13, Number 3: December 2012
ISSN: 1535-0975

activities sans workbook and connecting texts and reading experiences to one another, as well as to children's lives. Today we face a new challenge: teaching early reading skills effectively in the electronic reading environment using digital devices. As it goes, ebook pedagogy will likely be a hybrid of old and new reading instruction practices. Our study highlights structural similarities between traditional and ebook shared reading and explores the potential of ebooks for supporting children's word learning from books. It is grounded in what teachers know and do, and opens the door for examining what they may need to learn to realize the potential of ebooks in the early literacy curriculum.

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Volume 13, Number 3: December 2012
ISSN: 1535-0975

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Appendix A

Segment	Steps	Check *if present*
Before Reading	Point out title and author	
	Discuss what story is about	
	Introduce vocabulary words (Say, Tell, Do)	
During Reading	Listen or Read Aloud	
	Pause to discuss	
	Highlight new words (Say and/or Tell and/or Do)	
After Reading	Ask for favorite part	
	Repeat new words (as needed)	
	Prepare for mobile reading	

Appendix B

Shared eBook Reading Plan		
Title: Date: New Words:		
Instructional Segment	**Plan**	**Notes** *Note pre-selected screens for instruction; information/ vocabulary to point out; organization for mobile reading*
Before *Use pocket chart for introducing target words*	• Point out title, author • Discuss what the story is about • Highlight vocabulary words (Say; Tell; Do)	
During	• Listen or Read Aloud • Pause to discuss • Highlight new words (as needed)	
After	• Ask for favorite part • Repeat new words (as needed) • Prepare for mobile reading	
Mobile	• Distribute mobile devices to individuals or pairs • Select place to browse/read • Monitor engagement	
Observations		
Note: Keep vocabulary instruction short and simple. (1) Say target words and ask children to say them. (2) Tell about the word meaning and encourage children to talk about the meaning a little bit. (3) Use a gesture (if possible) to help children remember the word; invite children to use the gesture + say the word.		

Appendix C

Week 1		
eBook Title	Me Too!	
	Vocabulary Word	Definition
	envy	Wishing you had what belongs to another person
	aquatics	All about things you do in water
	coach	Person who teaches
	privacy	Wanting to be alone, not bothered
	wonderful	To like something or someone
	play date	Planning a time and place to play with another child
	binkies	A name for a baby's pacifier/Nuk. Something a baby sucks on to stay quiet.
	copies	To do exactly as someone else
	lock	A tool used to keep people or things in or out/ cannot open an object
	giggling	When people are laughing quickly in a high voice

Week 2		
eBook Title	Porcupining	
	Vocabulary Word	Definition
	bucky	When your front teeth stick out.
	console	To makes someone feel better when they are sad.
	habitat	A place where an animal lives.
	hutch	A large box made of wood and wire for a small pet to live in.
	lodge	A home that a beaver lives in.
	lonesome	Sad and all by yourself.
	porcupine	An animal that is covered with lots of sharp spines called quills growing all over its back and sides.
	quills	Long, sharp spines that are on a porcupine's body.
	sow	A girl pig.
	wife	When a girl marries a boy she is the wife.

Week 3		
eBook Title	Hoover's Bride	
	Vocabulary Word	Definition
	repairs	To fix something that is broken or damaged
	sprouted	Starting to grow
	collapse	To fall down suddenly
	stagger	To walk or move unsteadily, almost falling
	reception	A large party to celebrate

	flatter	To praise someone to make them happy, but what you say is not true
	appliance	A piece of equipment used in people's homes
	machine	A piece of equipment with moving parts that uses power such as electricity to work
	level	To make something flat that has not been flat
	fled	Run away

Week 4		
eBook Title	Something Good	
	Vocabulary Word	Definition
	snuck	To go somewhere secretly or quietly so that you are not seen or heard
	rot	To become bad
	hundred	A very large number of things
	price tag	A piece of paper with how much something costs on an item in a store
	cart	A large wire or plastic basket on wheels you use in a store
	aisle	A long path between rows of shelves in a store or building
	trouble	To cause a person problems
	knocked	To hit something
	cash register	A machine used in stores to keep money in and count money from sales
	shelf	Long, flat boards or metal rectangles on a wall or in a cabinet used for holding objects

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Deconstructing Definitions: Repositioning Technological Access & Literacy within Agent Ability

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Abstract

Our society cannot have concerns about access without literacy because they are congruous; neither is distinct nor complete without the other in technological contexts. The United States Department of Education repeatedly calls for more, better, and increased access and literacy to technologies. Our elected officials make national speeches imparting similar rhetoric and ideas. A problem with this particular information dissemination by inherently powerful entities or persons is they make assumptions of what access and literacy are, with minimal definition, and virtually no context of agent ability with technology. These ambiguous terms and deficient definitions have subsequently proliferated in academic scholarship, pedagogy, and even across the globe. The purpose of this paper is to theoretically reposition access with literacy and place them in context of agent ability in order to provide a framework for future conversation.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

"We know, purely and simply, that every single child must have access to a computer, must understand it, must have access to good software and good teachers and to the Internet, so that every person will have the opportunity to make the most of his or her own life." --- President Clinton

"I will recruit new teachers and make new investments in rural schools, we'll connect all of America to 21st century technology and telecommunications." --- President Obama

In 1996, the United States Department of Education published a report to the nation regarding technological literacy titled, “Getting America’s Students Ready for the 21st Century.” President Clinton himself lobbied for nationwide technology access and literacy during this time. Fourteen years later and after articles and books by notable scholars like Cynthia Selfe, Adam Banks, and Langdon Winner, both the US Department of Education and President Obama have refreshed the fervor for increased access for all with recent speeches and the publication of the 2010-2015 technology plan titled, “Transforming American Education Learning Powered by Technology.” Over the span of fourteen years, our nation’s leaders have been discussing access in the same redundant context, a build it and they will be able to use it model. The Elementary and Secondary Education Act of 1965 is the law that requires the Secretary of Education to publish technology plans like “Getting America’s Students Ready for the 21st Century” and “Transforming American Education Learning Powered by Technology”. Part D Subpart 2 Section 2422 of this law states that the publication must include how the secretary will promote “increased access to technology for teaching and learning for schools with a high number of or percentage of children from families with incomes below the poverty line” ("Elementary and Secondary Education Act"(1965))[1]. Implicitly, this law assumes that by simply putting the technologies in place, access is granted, but “access” is not defined nor is “access” constructively connected to

[1] The Elementary and Secondary Education Act is a federal statute that was first enacted in 1965. However, it has been reauthorized (adapted, edited, and updated) by the government every five years since.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

pedagogy of technology literacy necessary to facilitate access. In fact, neither definition nor discussion of technological literacy is explicitly included in the law itself or in the most recent government publication that are a result of the law. The problem is a lack of clear definition and meaning of ideas by entities or persons of power which is then left up to interpretation, re-interpretation and even blatant misuse by our educational institutions, or society at large.

Because of the inherent power that governmental organizations like the U.S. Department of Education possess, it is crucial to create a current framework for technological access and literacy that better represents and explicitly identifies the relationship between access and literacy. For clarity, the use of the words technology and technological in this paper refer to digital hardware and software (computers, programs, and other types of electronic devices used to send and receive information, for example cell phones and video game devices). In order to clearly define the relationship between access and literacy, human agency (also referred to as *agent ability* in this text) will also be explored and defined. The purpose of this paper is to theoretically reposition technological access with literacy and place them in context of agent ability in order to provide a framework for future conversation. The conversation should be a global one. The United States government's decisions directly affect our educational systems, but the students within these systems are not all US citizens. Furthermore, because of the inherent power our government possesses, we need to consider its potential ability to influence other governments.

Ability as Access

Access to technologies is assumed to be widespread. It would seem safe to say that over the last fourteen years greater access has been provided to schools and communities; however, attaining access requires much more than a computer and an internet connection.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Access means more than that. Examining dictionary definitions is a first step to building a new framework. "Access" is defined as "the *ability* (emphasis added), right, or permission to approach, enter, speak with, use, or admittance,"("access." def.1). The word ability needs to be examined because right, permission, and admittance imply that access provides power to do or act. With ability, that is not the case. "Ability" is defined *as,* "the *competence* (emphasis added) in an activity or occupation because of one's skill, *training* (emphasis added), or other qualification" ("ability." def.2). Ability requires more than power to do or act; the agent must have competence, skill and/or training. According to Samantha Blackmon, every person brings their own experiences with technologies, or lack thereof, to the table. It cannot be implied that every individual will be "competent, comfortable, and confident" with technologies due to having material access alone (154). Examining ability further, I turn to Benjamin Franklin and one of his many commentaries on education. Not only did he contribute to the creation of the nation, but his thoughts on education led to the creation of the institution now known as the University of Pennsylvania. Franklin argued that,

> The Idea of what is true Merit, should also be often presented to Youth, explain'd and impress'd on their Minds, as consisting in an Inclination join'd with an Ability to serve Mankind, one's Country, Friends and Family; which Ability is…to be acquir'd or greatly encreas'd by true Learning; and should indeed be the great Aim and End of all Learning. (30)

Ability is learned skills and knowledge, along with broader reasoning and the desire to serve more than one's self. Thus, our current assumptions about ability and technological access need to be redefined in order to expand our notions of ability to encompass individual, community, and even global issues.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

When discussing access, we have seen politicians and educators focus on material access – the physical access to technologies. However, Adam Banks has identified multiple levels of access beyond material access. Banks outlines five access levels which include: 1) material access, equality in material conditions; 2) functional access, knowledge and skills to use the tools; 3) experiential access, making the tools relevant; 4) critical access, ability to critique, resist and avoid when necessary; and 5) transformative access, inclusion into the development and decision making (41-45). These five levels are significant because they illustrate that more than hardware (material access) is needed to provide users with the "ability" to achieve technological "access".

Regardless of "material" access, agents still have to experience and learn to use the technologies they will encounter, making access contextual. As Dennis Baron examined in his article "From Pencils to Pixels: The Stages of Literacy Technology," even a pencil is a technology. Both computers and pencils required the skill of engineers and designers to create the final useable product. Although the learning curve of a pencil may not be perceived as arduous as it is with today's choices of technologies, human agents do not inherently know to pick up a pencil and write; we are taught. We are also taught how to use pens, markers, crayons, etc. The basic concepts apply for each of the different writing utensils, yet each one may have a slightly different feel and end result. The same can be said regarding digital technologies such as those used in academic settings.

Kevin Guidry, whose research focuses on technology use by students and faculty, mirrors both Blackmon's and Banks' concerns when he hypothesizes that technological access cannot be assumed due to its multi-dimensional implications of use. In the context of educational technologies, he discusses the consequences that technologies have for the student population (Guidry).

Volume 13, Number 3: December 2012
ISSN: 1535-0975

> Even students who have had access to technology have had different experiences with it and have thus gained different skills, predilections, and comfort levels with different technologies[…]embracing not just mere access but differing types of access. Since the amount of time for and the environment in which one uses technology shapes ones uses and understanding of technology, students who come from backgrounds where they had less access to the Internet use and view it differently compared to those with significant or unlimited access. (Guidry)

It is a false assumption that agents in educational settings have had equal exposure to the myriad of possible technologies. Even if there were such a thing as equal "material access," agent access as a whole will be variable because the experience of each agent is different. Conversely, access can shrink if the agent does not continue to actively employ the learned skills and knowledge as identified in labor situations where an extended period of job separation leads to particular skill and ability loss pertinent to the separation from the job. For example, 16 years ago I was a radio DJ. I was knowledgeable not only of the operation of the physical technologies, but of my audience, the genre of music, legalities, and other implications that need to be considered when conducting a live radio show. Even if I was given physical access to the microphone and soundboard today; I would neither feel comfortable nor confident in conducting a show without further instruction, research, and forethought. Technologies, whether tangible or intangible, do not all come with identical functionality. A learning curve exists with each technology; we are not all born "able" and our ability is not static or guaranteed in use of the technology.

Since all agents do not have equal experiences and abilities with technologies, a variance exists in how agents potentially interact in the various contexts with different technologies. Yet, assumptions about access run rampant in our education systems, as seen by

Volume 13, Number 3: December 2012
ISSN: 1535-0975

the pervasive expectation of technological use by its agents. For example, in my experience at Michigan Technological University, there is an expectation of using the Blackboard Learning System CE (system for learning management) for both faculty and students. As a new graduate student I did not receive any instruction on how to navigate the system, and the assumption was made that I would know to go to the Blackboard system to look for assignments and communications from the instructor. In discussion with a few faculty members, some did and some did not receive instruction on the system, yet it is mandatory to submit grades through the system. If the expectation is for the faculty to use the system for submitting grades, time needs to be spent instructing them on the navigation of the system. If the faculty members are using the system to provide course content and communication to their students, they in turn, should provide navigation instruction to their students on the system.

Written instructions on Blackboard navigation are posted to the university website; however, the majority of the content appeared to be written for the faculty. The assumption is made that students do not need much, if any, training or instruction other than what the program itself provides. During a recent technologies survey conducted by Michigan Tech in 2010, this problem was made clearly evident in the results of the survey regarding Blackboard. The average satisfaction of services and support for Blackboard was 2.89 on a 5 point scale (5 being “outstanding”) and was the third lowest score overall. The Blackboard results “were not significantly different between students and faculty” (Milligan 6).

We cannot assume that every agent in our educational system possesses competence, skill, and training in all of the technologies they encounter both in and out of the classroom. If an agent has access, does this mean they will have ability? According to scholar Marc Prensky, today’s students are in fact “digital natives” and have spent their entire lives with

technology. Prensky makes the assumption that they all have equal access and subsequent ability (1). Although it is feasible to agree that today's students possibly "think and process information fundamentally differently" than "digital immigrants" (those that were born before "digital natives"), (1) it is not plausible or possible that all "digital natives" have the same access to technologies, particularly in educational settings. The diversity throughout our country (cultural, financial, ethnic, etc.) provides a potpourri of experience and exposure to/with technologies, and/or lack thereof. Prensky is making dangerous assumptions about user access by basing his theories of access, and subsequently ability, solely on age. Making assumptions about technological access and ability is a mistake we cannot continue to make. Scholars like Stuart Selber do attempt to move the conversation forward by at least considering the differences that increase the gaps in access, unlike Prensky who puts everyone into age defined categories. Selber states that the poor, people of color and women don't and probably won't have equal access to technologies. However, he is still situating access as physical (4). It is important to keep the inequalities in the forefront of our conversations to avoid basing decisions on false assumptions, but we need to advance how access is defined farther than its current state.

Ability as Literacy

Further complicating the assumptions made about access is the direct connection of access to literacy. Both in government and educational systems, there are a myriad of different views on what makes up technological literacy, but there is no definitive understanding or clear definition of what literacy is in the context of technologies. James Paul Gee recognized the political and social underpinnings of the "literacy crisis" in his book "Social Linguistics and Literacies: Ideology in Discourses." He argues that all views of literacy are politically charged and need to be thought of in social and cultural terms (Gee

Volume 13, Number 3: December 2012
ISSN: 1535-0975

31); we need to think contextually. Over the past fifteen years our government has been focused on a new literacy crisis, a technological literacy crisis.

In “Getting America 's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge: A Report to the Nation on Technology and Education”, the U.S. Department of Education declared technological literacy as “meaning computer skills and the ability to use computers and other technology to improve learning, productivity and performance” ("Getting America 's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge: A Report to the Nation on Technology and Education "). This report does not define what it means to be able, and then assumes that one is either able or not able to engage in technologies in a manner that produces a desired result of better performance or production. As such, it does not consider the ramifications of context, agent ability or varied levels of access. Ability, critical thinking, creative solutions, the context of use and the sharing of knowledge are all missing from our government’s definition. The ambiguous laws and definition deficient documentation put out by government agencies are left up to interpretation by our educational system.

Educational systems should not be focused on efficiency and productivity; rather the concern should be with what is informing the pedagogy. Selber argues for the use of a postcritical stance and warns that if scholars do not, the implication will be that the pedagogy will be informed by values and practice that are not compatible or desirable to educating students on technologies in a critical, contextual and historical sense. Ultimately, these initiatives will “perpetuate rather than alleviate existing social inequities” (13). The initial dissemination of the No Child Left Behind Act by the U.S. Department of Education to educational institutions is a solid case to this point.

The result of leaving interpretations up to educational institutions is that scholars and

Volume 13, Number 3: December 2012
ISSN: 1535-0975

educators have taken various approaches to definitions. In the case of defining technological literacy, The National Council of Teachers of English's (NCTE) mission is to *promote the development of literacy at all education levels. Their definition of technological literacy states that* "…technology has increased the intensity and complexity of literate environments, the twenty-first century demands that a literate person possess a wide range of *abilities* (emphasis added) and *competencies* (emphasis added), many literacies…" ("The NCTE Definition of 21st Century Literacies "). The NCTE is trying to go beyond the traditional reading/writing assumption of what it means to be literate. They understand the need to incorporate technologies in the definition; however, the ambiguity of the definition does not provide a firm stance on what it means to have technological literacy. For comparison, the South Dakota Educational Technology Standards Glossary defines literacy as, "the *ability* (emphasis added) to use, manage, assess, and understand technology" ("South Dakota Educational Technology Standards Glossary"). This definition helps to narrow the focus from NCTE's ambiguous "many literacies," but it falls short without further clarification of what it truly means to "assess" and "understand" technologies. Additionally, The Washington Superintendent of Public Instruction Office states: "Technology literacy is the *ability* (emphasis added) to responsibly, creatively, and effectively use appropriate technology to:

- communicate;
- access, collect, manage, integrate, and evaluate information;
- solve problems and create solutions;
- build and share knowledge; and
- improve and enhance learning in all subject areas and experiences."

("Educational Technology: Defining Technology Literacy")

This definition acknowledges the necessity of ability, but only outlines what the ability

should look like in a technologically literate person without offering explicit definition. In review, from these three definitions it can be deduced that technological literacy, in the eyes of educators, is the ability and competency to interact with technologies.

When considering all definitions provided, the use of "ability" immediately stands out as the dominant component of what is necessary to be literate according to the definitions provided by educators and the U.S. government. As previously determined, full access, more than material, cannot be achieved without ability as it has been defined here. The striking similarities between access and literacy necessitate further exploration.

To fully explore access and literacy, we need to go back to Adam Banks' argument regarding access. He moves the conversation away from a single definition of access and into a five-level definition. He argues that individuals and groups not only need to be able to physically use technological artifacts (material), but need to have knowledge and skill of use (functional). He continues that they must also be free to critique and reject technologies (critical). Being able to design, create and to change technologies and policies in ways that are relevant for groups and individuals is also necessary (experiential), along with inclusion within the systems of power that determine where, how, and why technologies get made and used (transformative) (41-45).

Reconsidering Banks' argument and my discussion of ability and lining these ideas up against NCTE's definition of literacy, it is hard to deny the close resemblance between NCTE's literacies list, and Adam Banks' levels of access (Table 1).

NCTE – from definition of literacy	Adam Banks – levels of access
Proficiency with the tools of technology	Functional Access – knowledge/skill
Build relationships with others/solve problems collaboratively	Transformative Access – inclusion/decision-making
Design and share	Experiential Access – design/create/change
Critique, analyze, and evaluate	Critical Access – critique/reject

Table 1:NCTE Literacy vs. Banks Access

Although not as inclusive to all levels of access, the definition of literacy by WA Superintendent of Public Instruction Office also bears resemblance to some of the five levels of access outlined by Banks as shown in Table 2.

WA Public Instruction Office – definition of literacy	Adam Banks – levels of access
Build and share knowledge	Transformative Access– inclusion/decision-making
Access, collect, manage, integrate, and evaluate	Critical Access – critique/reject
Solve problems and create solutions	Experiential Access – design/create/change
Improve/enhance learning in all subject areas/experiences	Transformative Access– inclusion/decision-making

Table 2: WA Public Instruction Office Literacy vs. Banks Access

Thus, if "ability" is the key component to the definitions of literacy and mirrors the components of what makes up access, I propose the following theory:

IF [Access = Ability] AND [Ability = Literacy] THEN
[Access IS Literacy/Literacy IS Access]

Throughout the rest of this paper, the words "access/literacy" will appear side by side; one cannot assume the word "access" should replace the word "literacy" or vice versa. My theory suggests that the line between access and literacy has become irreparably blurred into one concept and therefore needs to be examined as a whole. It is no longer plausible to believe that they are two separate issues.

Ability as Agency

Agency, in the context of this paper, refers to "the *capacity* (emphasis added) of individuals to act independently and to make their own free choices"(Barker 448). As humans, we are able to think and make decisions on our own behalf. Looking at the definition of capacity, it is: "actual or potential *ability* (emphasis added) to perform, yield, or withstand" ("capacity." def.3). Ability is the key component of access/literacy, as well as agency. In the

pursuit of access/literacy, an agent's only limitation is his or her inability to make decisions whether to engage in a technology, how to engage, and when to engage. It is our choice as humans to achieve access/literacy providing we are "able" to believe we are "able" to do so.

Scholars, politicians, educators, and peers can all help to pave the way by providing exposure to technologies, but ultimately the decision to engage in the technologies is left to the individual; however, as discussed previously, educational institutions need to be cautious of what and who is informing the pedagogy. For example, access is represented in the publication "Transforming American Education Learning Powered by Technology" like the very existence of the technologies themselves is what empowers the agent with ability to effectively engage with the technologies. Within this document, statements in reference to technologies like "today's educators should have *access to technology-based resources that inspire them* [emphasis added] to provide more engaging and effective learning opportunities for each and every student" (16), or the statement "students and educators need *adequate broadband bandwidth for accessing the Internet.…"adequate"… defined as the ability to use the Internet* [emphasis added] in school, on the surrounding campus, throughout the community, and at home" (17). The most disturbing statement from this document is "*they* [emphasis added] provide the ability to participate in online learning communities"(11). These statements are undeniable examples of the cross talk and inadequate definitions that are put upon educational institutions to muddle through and interpret.

Educational institutions, much like any organization that is for profit or not for profit, follow the norms of business practices to remain in existence. Practices such as strategic planning are vital to the longevity of an organization. Strategic planning helps an institution to define its future. When educational institutions are left to interpret inadequately defined information that they are supposed to follow, the diversity in interpretations is obvious when

universities publish their strategic plans. The plans are a reflection of the role of technologies and the importance of production and growth which are blended along with ill-defined ideas of access and implied ability. These documents contain no explicit or even implicit reference to technological literacy. For example, the University of Missouri-Kansas City's strategic plan states their intent to "empower all students to contribute to a demographically and technologically complex world" ("Strategic Plan 2010-2020: A design for the future of Kansas City's University"). Similarly, Penn State University takes a broad brush in their strategic plan by stating the intent to "use technology to expand access and opportunities" ("Priorities for Excellence: The Penn State Strategic Plan 2009-10 through 2013-14").

A university (administration and faculty) cannot empower its students to be prepared to face the challenges of technologies without focusing on agent ability in the context of access/literacy. Again, Benjamin Franklin identified this struggle. He argues,

> Many of the first Settlers of these Provinces, were Men who had received a good Education in Europe, and to their Wisdom and good Management we owe much of our present Prosperity. But their Hands were full, and they could not do all Things. The present Race are not thought to be generally of equal Ability: For though the American Youth are allow'd not to want Capacity; yet the best Capacities require Cultivation, it being truly with them, as with the best Ground, which unless well tilled and sowed with profitable Seed, produces only ranker Weeds (1).

The leaders and educators of our country have the best intentions, but cannot do everything and the importance of capacity gets lost. Greater access cannot be reached with technologies if the agent's access/literacy to the technologies is based on false assumptions and with no clear framework for building up agent ability through instruction molded on all the areas of technological access/literacy. Based on these strategic initiatives, it appears that universities

Volume 13, Number 3: December 2012
ISSN: 1535-0975

are actively taking the assumptive direction that our laws and lawmakers have provided and the result is many agents are left behind.

Ability as Global Problem

The challenge of navigating technologies does not occur in every corner of the world. Yet, as technologies are being distributed to more remote regions of the globe, they are proven to have a profound effect as shown in the case I will explore below. Access in an impoverished form is removed from literacy entirely, resulting in consequences that not only affect the agent, but families, communities, and countries at large.

Langdon Winner points out that the American assumption of progress is only inclusive of new technologies which inherently requires our lawmakers to position technological development and the human condition in a positive light with the promise "that the next wave of innovations will surely be our salvation"(5). There is always a price for this "progress". For example, a new technology, vasectomies, were first performed in 1899 for eugenical purposes, at the Indiana State Reformatory. This procedure was conducted on men who had been committed to the institution, (Popenoe 19) making the United States the first country to actively and legally conduct a compulsory sterilization program (Iredale). This technology, and similar sterilization technologies (hysterectomy, tubal ligations, etc.), used for this particular dubious purpose did not stay localized to the United States; they were spread to countries like Canada, Peru, and China. Probably the most well-known country to adopt this practice was Germany. Adolf Hitler, inspired by the United States, passed a law that used modern technologies to legally sterilize hundreds of thousands of individuals during his reign (Kershaw). Despite this history, there are still government agencies that target their poor and uneducated through monetary incentives to "voluntarily" undergo a sterilization procedure typically to the detriment, not the betterment, of their society. In India for example,

men of no means (unemployed, underemployed, alcoholics, gamblers, etc.) frequently make this choice (Nussbaum).This would seem like a great preventative for the overpopulation problem in the country; however, if a couple is childless and a partner chooses sterilization, the risk of spousal abuse increases. Research conducted in northern India determined that there is "the significant relationship between childlessness and both physical and sexual violence, highlighting an additional negative social consequence for Indian women associated with childlessness" (Koenig et al.). Although this current system puts the agency back in the hands of the individual, it is with impoverished access and no literacy that the decision to sterilize is being made. It is impoverished because the level of ability of an uneducated alcohol dependent agent, for instance, is not sufficient and the only access an agent has in this position is material. Offering money to an individual who is desperate is like offering the cornucopia that Winner talks about, he says "the form of technology you adopt does not matter. If you have cornucopia in your grasp, you do not worry about its shape" (45).

What do these examples have to do with education? The connection between educational institutions, United States laws (with a focus on those under the Department of Higher Education), and developing countries can be labeled as internationalization. In an article titled "The Internationalization of Higher Education: Motivations and Realities" Philip Altbach and Jane Knight focus on academic internationalization, the movement of educators and students across borders. United States colleges and universities are not only engaged in student exchange, but exporting education as well. The face of education is changing in these borderlands. Developing countries, particularly India's higher education sector, "imports and exports programs and services at an unprecedented pace"(297) and it can't keep up with the demand. According to Nayar, the "500 universities and 26,000 colleges have space for only about 12% of its eligible youth" (24). Unfortunately quality is also a problem and "many of

Volume 13, Number 3: December 2012
ISSN: 1535-0975

the students are graduating with abysmal literacy and numeracy skills" (25). Last year President Obama, along with three U.S. university presidents and several other senior university representatives, met with the Indian Prime Minister Manmohan Singh. India's government is not only counting on financial infusion, but also expertise from foreign academic institutions and the U.S. is happy to step into a new academic market. The meeting between governments and academic institutions resulted in an agreement to "hold a U.S.-India summit on higher education this year to help encourage collaborations"(Nayar 26). The summit occurred on October 13, 2011 with the objective of strengthening higher education collaboration and exchange between U.S and India institutions. The collaboration is backed by ten million dollars for increased university partnership and junior faculty development according to Secretary Hillary Clinton in her opening address at the summit ("U.S. Department of State"). Given the current low reading/writing literacy in India and questionable government practices in the country, the U.S. should tread very lightly as they move forward with this academic collaboration since our own laws pertaining to technologies in educational practices are ambiguous.

Conclusion

Before we dangle the proverbial carrot, implement the latest upgrade, design new technologies, or pass laws and other legislation regarding technologies, we should consider not just how the technologies will fit into our world, but most importantly *if* they should be there in the first place. From a "world making" perspective, Winner suggests that "we pay attention not only to the making of physical instruments and processes…but also to the production of psychological, social, and political conditions as a part of any significant technical change (17). We need to be considerate of not just the physical artifacts that are created, but careful attention needs to be paid to the possible implications (both positive and

Volume 13, Number 3: December 2012
ISSN: 1535-0975

negative) that could result in the artifact creation and use. Policies, implementations, and laws are all a part of the possible implications to systems that are currently in-place. Ultimately these implications affect the human agents that must work with and/or within those systems. In order to begin consistent dialog both in and out of the academic field, and particularly across borders, we must define the meaning of access and literacy in the context of technologies. We must do so while being acutely aware of the role that agent ability plays in this context. I hope that the framework of access/literacy in the context of agent ability I have constructed will provide a starting point to the conversation.

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Evaluation of students' digital animated multimodal narratives and the identification of high-performing classrooms

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Abstract

Contemporary approaches to literacy embrace digital and multimodal communication, and this is increasingly recognised in the syllabi prescribed by various education authorities across the world. Insufficient attention has been given to the evaluation of multimodal texts in ways which are semiotically grounded, accessible to the teacher and scalable to larger research studies. We present an evaluation instrument that addresses these requirements. The application of this instrument to 81 texts drawn from 17 classes has established the viability of the approach and allowed a subset of 'high achieving' classes to be identified. The derivation of the instrument is described in detail, the final form presented, evaluator guidelines elaborated, and the rating scales developed in full. Limitations are discussed along with recommendations for further work and development, but as an evaluation initiative the current work is presented as an important contribution to the continued development of multimodal pedagogy.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

The reconceptualization of literacy in the context of our increasingly digital, multimodal information and communication world is now becoming more widely and prominently recognized in the curriculum requirements of government education authorities (England 1999; Australia 2009; Singapore 2010). With electronic, multimodal texts not only the dominant and preferred medium of today's digital generation, but also a required aspect of mandated curriculum documents, teachers in various ways have been weaving multimodal literacy into students' interpretive textual experience and to a somewhat lesser extent, into their text creation experience. However, while new digital multimodal literacies pedagogies are evolving (Anstey and Bull 2006; Unsworth 2008; Mills 2010; 2011), relatively little attention seems to be given to the development of an appropriate approach to the assessment of multimodal literacy development (Unsworth and Chan 2008; Unsworth and Chan 2009), especially in relation to students' creation of multimodal texts (Baxter and Simpson 2008; Kimber and Wyatt-Smith 2008; Macken-Horarik 2008). A very general conceptualization of an approach to evaluating dynamic digital and filmic texts produced by junior high school students in response to literature in the English classroom has been devised by Kimber and Wyatt-Smith (2008). They see the evaluation of such texts at the intersection of the textual evidence for students' *e-proficiency* (skill in the utilizing software affordances) and the quality of the textual *content*, *cohesion* and *design*. While this is a useful framework there is no specification of criterial textual features that would differentiate quality in respect of the four dimensions, and from the descriptive accounts of them it is difficult to clearly distinguish between *cohesion* and *design* features. On the other hand, working with primary school students' production of claymation, stop-motion movies, Mills (2011), following the work of Andrew Burn (Burn and Parker 2003; Burn and Leach 2004; Burn and Durran 2006), has related the meaning-making affordances of filmic text production to the "grammar of

Volume 13, Number 3: December 2012
ISSN: 1535-0975

visual design" extrapolated by Kress and van Leeuwen (2001/2006) from Hallidayan linguistics (Halliday 1978; Halliday and Matthiessen 2004). This enables a specific text-focussed, differentiated analysis of the students' movies providing the basis for feedback on learning and guidance to teaching. A somewhat similar approach was used by Thomas (2008) to discuss the quality of machinima produced by primary school students. However, this work has not extended to the formulation of a validated consistent procedure or specific instrument for systematically evaluating students' filmic texts.

This paper addresses the evaluation of digital animations in the context of our work facilitating middle years students' creation of 3D animated narratives (Chandler, O'Brien and Unsworth, 2010). Authoring narratives using 3D animation involves the students using computer software to create a movie in many respects similar to movies created using live-action work with a video camera. To write/create using 3D software involves harnessing systems of choices for making meaning. The complete repertoire of meaning-making resources available in 3D multimedia is quite simply vast, framed (for example) by Cope and Kalantzis (2009) in terms of five modes: linguistic, visual, spatial, gestural and audio. To support students' ongoing development of 3D animation authoring and to determine the most efficacious teaching practices, we need to derive a means of assessing the effectiveness of students' deployment of these multiple meaning-making resources. We have sought an instrument that teachers and researchers can apply systematically and relatively quickly in responding to students' work, providing informative feedback, and which could be scaled to provide systematic evaluation of several hundred texts. In this paper, we outline our approach which (a) attends carefully to intra-modal meaning (b) has the capacity to attend to inter-modal meaning (c) is suitable for the evaluation of relatively briefs texts developed by young, inexperienced authors and (d) can be readily applied to the bulk analysis of texts.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

The centrepiece of this article is the development of the evaluation instrument itself, the use of which is demonstrated through the identification of 'high performing' classrooms. The identification of such classrooms is important so that subsequent work can draw on other observational and case study data in order to explicate features of teaching and learning which are important in the creation of high quality multimodal texts by school age students. The discussion proceeds as follows. Firstly, the framework for an evaluation instrument is described in principle, followed by a presentation of the particular evaluation instrument used in our investigation. The detail of how that instrument was used to broadly discriminate between the quality of work from 17 classes is then presented. The paper concludes with a discussion of the efficacy of the approach and implications for future development and application.

Evaluation by attending to semiotic systems

The starting point for the evaluative approach we are advancing is to consider the systems of choices that a creator of multimodal texts makes. A simple description for still images of the manner in which various design elements (or codes) and conventions together form a system from which combinatorial selections are made to convey meaning was provided by Anstey and Bull (2006, p. 108) and is shown in Table 1.

Table 1: Design elements and conventions in still images combine to make meaning (Anstey & Bull, 2006, p. 108)

The design elements of	*are combined through*	*the conventions of*	*to make meaning*
• Colour • Texture • Shape • Form		• Balance among design elements • Layout (how attention is attracted and focused) • Vectorality (how the eye is led through the image)	

We adapted this description to form a 'template statement' as the basis of our approach to

Volume 13, Number 3: December 2012
ISSN: 1535-0975

evaluation

> the text makes meaning by attending to *[category of meaning]* by strategic deployment of conventions associated with *[design element]*

For instance, "the text makes meaning by attending to *still images* by strategic deployment of conventions associated with *colour*", and separately, "the text makes meaning by attending to *still images* by strategic deployment of conventions associated with *texture*", and so on. Thus, an evaluation of a whole text can proceed by attending to relevant semiotic systems, and then to the codes within each system.

Using a range of such evaluative statements scopes the task of evaluation by identifying the semiotic systems that should be considered, and degree of delicacy to which they should be addressed. The form of the evaluation (e.g. written comment, yes/no, rating scale) is a separate consideration and our approach is addressed later in the section *Towards an Evaluation Instrument*. It should be observed that the template statement does not specifically include the conventions: it is assumed that the evaluator is sufficiently familiar with the relevant semiotics, although evaluator guidelines have been developed to facilitate confirmation of this for our purposes (see Appendix 1). An evaluator needs to work within the context of the social purpose of the text (in our case, a narrative piece, dealing with unusual or problematic events and their outcomes) and the socially constructed nature of conventions involved. For instance, black is the colour of death in some cultures, where as white carries that value in others; red conveys particular meanings in some cultures, but less so in others. Similarly, size, shape, proportions, clothing, hairstyle of characters will communicate important information. There are choices of colour, props, clothing and actual location which will situate the text in a particular time of day, season or era. Special effects such as fog can be used, and may variously signify a spooky environment or evening closing

Volume 13, Number 3: December 2012
ISSN: 1535-0975

in. In short, the approach we advance assumes that the evaluator is semiotically knowledgeable.

A list of evaluative statements is not intended to be either exclusive or definitive. The intention is to scope the evaluative effort – items 'to attend to' – not to provide a checklist that of items that must always be covered and never exceeded. For instance, by listing 'colour' as one of the evaluative statements does not imply that black-and-white line drawings would be automatically criticised – the evaluator can attend to the matter of colour and make a judgement that it is not relevant in this case. Rather, in thinking through how adequately the text addresses the meaning communicated through still images, the approach ensures that considerations of colour are not overlooked. Thus, the intention is that evaluative statements would help structure an overall evaluation of a text as an entire and coherent communicative enterprise. Later in the discussion, we will also note some examples of how authors/creators can attend to some of the design elements in particularly creative ways which belie treating the design elements or conventions as a mere checklist.

A further observation of this approach is that it tends to treat each semiotic system independently. If, for instance, a voice-over or background music were provided to accompany a still image then the design elements of each system would be treated separately, and there would be a risk of inter-semiotic meaning not being addressed. We need to identify this limitation from the outset and we have included a separate means for recognising those (see section on *Other Considerations*).

Having discussed, in general terms, an approach by which an attention to the multiple systems of meaning and the design elements thereof can be used to frame an evaluation, we now turn to the application of this approach to those systems of meaning available to the 3D multimodal author and readily used by young, inexperienced authors/creators.

Semiotic systems and codes identified from the software environment

Whilst this paper contributes to the general endeavour of improving the evaluation of multimodal digital texts, such texts can only be realized through the affordances of the particular (software) tools used to create them. The evaluation needs to take this into account, and is shaped, to some extent, by the functionality and capabilities of the software tool. Necessarily, we draw on an intimate knowledge of a particular item of software, *Kahootz* (Maggs, 2008), but in a way that would readily transfer to other products currently in the marketplace[2]. We also attend to the systems of choices that are relevant to the type of text regardless of the system used to produce it, which could also include techniques such as live action filming, stop-motion animation or claymation. Through close attention to the software functions available, two broad systems of choices can be identified which map onto two of the systems of meaning-making within Hallidayan linguistics (Halliday & Matthiessen, 2004): the ideational and interpersonal. The following presentation of the development of the template evaluation statement for the respective systems and codes has been informed by an insider's perspective of the software and references to key elaborations of the Hallidayan framework in relation to still image, moving image and sound (Kress & van Leeuwen, 2001/2006; van Leeuwen, 1996; van Leeuwen, 1999). The ensuing discussion concludes with a consideration of the third of the Hallidayan systems, textual meaning (or compositional meaning), and presentation of 'other considerations' which have been included in our instrument. That leads into a subsequent discussion of how these various components have been fashioned into a workable instrument by considering the issues of text-based evaluation, unit of analysis and a rating scale.

[2] Further examples of software of this type include *Muvizu* (http://www.muvizu.com/), *Kids Movie Creator* (http://www.kids3dmovie.com/en_01/Products.aspx), *Alice* and *Storytelling Alice* (http://www.alice.org), *Moviestorm* (http://www.moviestorm.co.uk/hub/australia), *Reallusion* (http://www.reallusion.com/) and *Anim8or* (http://www.anim8or.com).

Volume 13, Number 3: December 2012
ISSN: 1535-0975

'Creating a world': ideational and textual meanings

The representational/ideational system is concerned with communicating the nature of events, the objects and participants involved and the circumstances in which they occur (Unsworth, 2001, p. 18). As we proceed to elaborate, 'creating a world' principally involves these systems of meanings.

Using *Kahootz*, a 3D multimodal text is developed and presented as a series of scenes. The author selects one of many worlds (or sets) on which this scene is then further developed. It is not possible to import additional worlds, so one is constrained to work with a base palette from the library of worlds, but with the capability to re-colour or re-texture (i.e swatch) modify or appropriate them for a range of purposes. For instance, what initially appears as lush grasslands can be re-coloured to be a sparse desert. It is further possible to move through the world and thus choose a different location from the initially presented one.

Each scene can be populated with a range of objects, which can be selected from the extensive in-built library (as it the case with 'worlds', it is not possible to import characters into *Kahootz*). The object can be re-sized, have its proportions changed, and aspects of each object can be re-swatched. Thus, following the initial choices about setting and location, the author must choose how to populate the world, a task that embraces set dressing, props and characters. Included within this are decisions about how the objects are physically positioned, as it would be possible to have these (appear to) float in mid air or be (partially) buried in the ground. Furthermore, there are choices related to the arrangement of these objects – showing a group of characters who are looking at each other to represent a conversation, for instance. Objects can be animated – that is, caused to perform built-in actions or move from one location to another.

In addition to adding visual objects to a scene, audio can be added. *Kahootz*, for

instance, contained an extensive library of sound effects, along with the ability to record and import sound and together with the capacity for manipulation by specifying volume, pitch, echo, tremolo and duration. The audio mode, therefore, is a design element alongside choice of world, physical positioning, swatching, etc.

From the preceding discussion, it should be clear that there are three 'categories of meaning' which contribute to the ideational system:

- Setting and location (for instance, selection and swatching a set, identifying a location, adding various objects as set dressing, choosing lighting and special effects and including background sound effects or music)
- Participant selection and construction (for instance, selection, swatching and sizing participants and including dialogue)
- Arrangements and interaction of participants (for instance, the positioning of participants, the eyelines and gestures used)

These are presented in Table 2, along with design elements to which one might reasonably attend. Table 2 is intended to be read in the form of the evaluative template statement, for instance: "the text makes meaning by attending to *setting and location* by strategic deployment of conventions associated with *temporal location*".

The text makes meaning by attending to …	*by strategic deployment of conventions associated with …*
Setting and location	Choice of location
	Mood and atmosphere
	Temporal location (time of day, season, era, etc)
	Material location (environment, objects, inhabitants, etc)
	Material processes (animation of environment, objects, inhabitants)
	Narration &/or dialogue
	Sound effects

	Background music
Participant Selection/Construction	Material composition of a participant: Base choice of participant
	Material composition of a participant: Color of participant, clothes, etc
	Material composition of a participant: Relative size and shape
	Material composition of a participant: Animation
	Narration &/or dialogue
	Sound effects assigned to a character
	Background music assigned to a character
Arrangement and interaction of participants	Physical placement
	Physical arrangement
	Material processes of participants (interaction)
	Narration &/or dialogue
	Sound effects

Table 2: 'Categories of meaning' and 'design elements' for 'creating a world'

As foreshadowed above, Table 2 is not intended to be an exhaustive semiotic analysis, but in our experience describes the design elements associated with ideational meaning that may reasonably be deployed by younger multimodal authors using *Kahootz*. Table 2 does not prescribe that a multimodal text must have deployed particular coding systems or used particular conventions. Rather, it identifies, for instance, that meaning must be communicated about the 'setting and location' and in order to do so the author/creator should attend to a selection of the available coding systems which communicate meaning about 'choice of location', 'mood and atmosphere', 'temporal location' etc. Meaning-making in some of these categories is a necessary inclusion – for instance, a visual text must be located in some 'place' – whereas a clear indication of temporal location may not be important. Furthermore, some would be a necessary inclusion because a particular criterion was established for student work, such as a requirement that 'your text should be in the style of a murder-mystery set in the late 1800s'. In essence, the approach is designed to primarily reflect the Hallidayan systems of meaning in ways that guide an evaluator, but in a manner which is neither

Volume 13, Number 3: December 2012
ISSN: 1535-0975

constraining nor formulaic and is also flexible and extensible to accommodate variations in teaching and expectation.

Table 2 reflects certain limitations of both the software and the extent of educational experience of the students. For instance, *Kahootz* does not have capacity to lip-sync visuals with audio, and has almost no capacity for facial expression or for controlling the direction of gaze, while the capacity for gesture – particularly to convey emotion (e.g. anger, frustration, disinterest) – is extremely limited, and certain complex actions (such as the hand of a character to be realistically shown to clasp an object) are almost impossible to achieve. In the context in which we worked, the primary effort was effective visual communication, and the audio mode treated in much less depth. Therefore, the three systems of codes related to the audio mode (narration, sound effects, music) are described to a much lesser degree of delicacy than the visual codes, and an appraisal of inter-modal collaboration was not able to be dealt with in any significant fashion. Should a teaching sequence allow for a more detailed consideration of the auditory mode, then a greater degree of delicacy (e.g. pitch, pace, timbre) can be represented in an analogous manner to the visual codes. The inclusion of a separate category under which inter-modal collaboration is considered in the section on *Other Considerations*.

Whereas much of Table 2 is self-explanatory, some entries require explanation, such as how an author chooses, and works with, participants. In *Kahootz* (and the issues are much the same for similar items of software previously mentioned), material objects (people and things) are selected from a closed library where they are already coloured, clothed, have a defined shape and have a designated initial size. Within limits, the author/creator is able to develop variations of each of these aspects. So if a character or object doesn't quite 'work' within an animated text, it is possible that the issue is not that the author/creator has not given

Volume 13, Number 3: December 2012
ISSN: 1535-0975

sufficient attention to the design of the character, but the initial choice from the library (the 'base choice for the participant') was not ideal. For example, we have observed student work to retell the legend of Theseus and the Minotaur in which the student chose a bull as the base object for the minotaur. Despite attempted modifications, in the end, it still looked rather like mutant bovine. It is important, therefore, that the evaluation instrument take into account the 'basic selection' to the extent that it can be known. Similarly, there are all manner of problems which might beset authors/creators when actually placing the participant in the world, such as someone who is supposed to be standing on the ground appearing to be sunk into it (physical placement), people who are supposed to be standing close to one another actually appearing to overlap in space (physical arrangement) or someone who is supposed to walk towards another actually moves in an inappropriate direction (material process). These are all matters which one would presume the animator would have 'solved' in professionally-produced animations, but might still be features of texts created by young multimodal authors, and are therefore relevant considerations. We further observe that it is important to consider the participants (the living creatures who the narrative is 'about') to a greater degree of detail than either props (inanimate objects crucial for the story) or set dressing (objects chosen to elaborate the setting and location), and in this way the evaluation instrument implicitly elevates the importance of working with the participant in the overall communicative act.

Finally, it needs to be observed that 'creating the world' embraces textual meanings along with ideational meanings. Simplistically put, textual meaning embraces two concepts: firstly, the *modality*, or the extent to which the representation is naturalistic, realistic or minimally generic; and secondly, *composition*, dealing with how the various elements are integrated into a coherent whole. Kress and van Leeuwen (2001/2006) discuss in detail the

Volume 13, Number 3: December 2012
ISSN: 1535-0975

use of colour to portray modality and in particular colour attributes such as saturation, depth, illumination, brightness – attributes which are deliberate choices of the painter or photographer, but not necessarily available for the young multimodal author, given the state of development of the software. For instance, the deliberate choice of using a photo-realistic figure in a cartoony landscape 'says something' about the believability of either the set or participant. So, elements of modality are addressed in relation to both choices of colour and choices of participant; the examples of either the bull as the minotaur or the African animal in an Australian landscape can't be merely dismissed as inappropriate choices as they fundamentally contribute to the believability and modality of the text. This is reflected in the guidelines (Appendix 1), but also needs to embodied within an evaluator's appreciation of the design elements.

As a visual semiotic concept, composition is possibly easier to grasp. Firstly, it is suggested that there are socially-constructed conventions associated with how participants are placed with respect to one another, such as the placement of one participant to the left or right of another carries certain meaning, as is deliberately placing an object or participant in the centre or the periphery of the screen. There are also visual techniques which highlight certain participants rather than others (salience) and the use of devices to connect different elements together (such as dressing all members of a family in the same shirt), or showing a group of people as friends by locating them close to each other and facing each other. Therefore, issues of participant arrangement are not restricted to technical execution, and it emphasises that choices relating to colour and texture are multidimensional ones, as is reflected in the guidelines (Appendix 1).

Having developed an evaluation instrument which considers the communication of ideational and textual meanings, we now proceed to discuss the construction of inter-personal

Volume 13, Number 3: December 2012
ISSN: 1535-0975

meanings.

'Showing a world': interpersonal meanings

In addition to 'creating the world', the author is engaged with making choices about how that world is 'shown to the viewer'. From the functional social scemiotic perspective (Halliday 1978; Kress and van Leeuwen 2001/2006; Halliday and Matthiessen 2004), it is through camera work and character positioning and movement that the nature of relationships between the participants in the text and the viewers of the text is established – the interactive/interpersonal systems of meaning (Unsworth 2001, p. 18). Through the camera, the multimodal author has ways of constructing social distance, social power and the extent to which the viewer is onlooker or participant, and through moving and relocating the camera, how these relationships change over the course of the text.

Five 'categories of meaning' can be identified through which the 'viewing experience' can be understood, arising from camera use, The categories of meaning relating to the viewing experience are:

- Sequencing of information (design elements which influence the order and the pace in which the information is presented)
- Viewer stance (that is, decisions relating to point of view)
- Camera distances (that is, to convey meaning related to social distance, and the use of the camera to hide or reveal information)
- The angles through which the information is seen (vertical camera angles conveying meaning related to social power, and horizontal camera angles conveying meaning related to involvement)
- The movement of the viewer with respect to that which is viewed

These are presented in Table 3, along with design elements to which one might reasonably attend.

The text makes meaning by attending to …	*by strategic deployment of conventions associated with …*
Sequencing of information	Sequencing of scenes
	Ordering of shots
	Pacing
	Narration &/or dialogue
	Sound effects
Viewer stance	Point of view
The selection of visual information (framing)	Camera distance
	Hide/Reveal
The angles through which visual information is seen	Vertical camera angles
	Horizontal camera angles
The movement of the viewer with respect to that which is viewed	Camera movement (e.g. zoom, tilt, pan, track and fly)

Table 3: 'Categories of meaning' and 'design elements' for 'showing a world'

As for Table 2, the systems and codes described in Table 3 are not semiotically exhaustive, but many of them are essential considerations. For instance, the camera is necessarily always positioned at a particular distance and angle. Though slightly awkward, terminology such as "the angles through which visual information is seen" is deliberately used to emphasize that it is how the viewer perceives the visuals that is ultimately significant – it does not matter whether the creator/author has achieved this effect by moving the camera or moving the participants, or produces some visual illusion which has the same effect. Whilst there may be a most obvious construction technique, in nearly every case, there are multiple ways of attending to each design element. These systems of meaning are potentially even more inter-related and subtle than 'creating the world'. For instance, one might elevate

Volume 13, Number 3: December 2012
ISSN: 1535-0975

the camera to glimpse a train rushing towards the participants from a distant location, but to do so could simultaneously imply a change of power relationship with a participant on whom the camera was previously directed.

To summarise the discussion so far: a template statement which can be used to focus an evaluator's work on a particular systems of meaning has been presented, and eight categories of meaning which are readily realised in animation software such as *Kahootz* have been presented. Along with these categories of meaning, some 31 design elements have been presented, each of which contributes to the meaning making in a category. Whilst attending to all the design elements listed is not essential, each of these eight categories of meaning must be considered in an evaluation process. For instance, it is not possible to construct a text which is not located somewhere (though it may be in a somewhat nondescript locality, era or time of day) and the camera must necessarily be operating at a particular distance and angle. No active decision in relation to 'viewer stance' may well result in a text which is seen through the eyes of a distanced, dispassionate observer, but to the viewer this is nevertheless important. Likewise, a text viewed via a stationary camera may be interpreted by a viewer as more like a news report than an action/drama, and so making no active decision has important consequences for how the text will be viewed. Similarly, arguments for the essential nature of the remaining categories of meaning can be advanced.

Other considerations

The discussion above, particularly as summarised in Tables 2 and 3, fully describes the categories, semiotic systems and codes that form the basis of our evaluation of student-created 3D multimodal texts. There are four additional categories, which we have identified as being important to evaluating such student work:

Volume 13, Number 3: December 2012
ISSN: 1535-0975

- Our particular interest is with multimodal narratives. Therefore, we include the need for an evaluation of the quality of the orientation, complication, evaluation and resolution of the text, as well as an item simply asking ‘is sufficient information communicated to tell a story’. That is, one essential category of meaning and five essential design elements.
- On-screen text has not been considered in the preceding discussion, although it could have been included in ‘creating a world’. The use of such techniques for titles and credits sets it apart from other elements, and if used for any other purpose (e.g. the words ‘one hour later’ appearing to indicate the passage of time) the conventions are somewhat unclear, and we therefore make a judgement about these separately. That is, one optional category of meaning and two optional design elements (‘titles and credits’ and ‘on-screen text’).
- It is important to recognise that sometimes significant technical innovation is employed. This may only be noticed by a very skilled observer who is highly familiar with the software platform. We believe that it is important to have a category to recognise significant student effort where it contributes to the overall communicative enterprise. That is, one optional category.
- The approach taken tends to regard the codes as operating somewhat independently rather than interactively within each semiotic system. This is compounded because the degree of delicacy is quite different for the auditory and visual modes. We have sought to ameliorate some of these difficulties by including a category on ‘multimodality’ which permits a global judgement to be made about the collaboration between the aural, verbal and visual modes. That is, one optional category.

In summary, we have identified eight categories of meaning and four other categories which

Volume 13, Number 3: December 2012
ISSN: 1535-0975

are the framework for an evaluation of multimodal texts, which together comprise a total of 40 possible design elements. We now proceed to describing how this has been further fashioned into a workable instrument by considering text-based evaluation, unit of analysis and a rating scale.

Towards an evaluation instrument

Text-based evaluation

The approach we advance is to identify the 'literal' or 'concrete observable' elements present in the text. Rather than trying to infer the author's intention our approach is to direct an evaluator's thinking to the appropriateness of "what is actually there". For example, the text may show a person: What colour is that person's clothes or hair? Is that person animated? Does s/he speak? Are we seeing that person from a high angle or a low angle? Are there other people whom we do not see initially, but are later revealed to us? And, most importantly, what meaning is created for us through this assemblage of attributes in their combination?

In addition to a 'literal' approach, our approach is that of an etic, or outsider's, perspective. As Harris (1979, p. 32) notes, an emic (or insider's) perspective would suggest that the insider (in our case, the student who created the text) would be the ultimate judge of the observer's descriptions or analyses, whereas

> etic operations have as their hallmark the elevation of observers to the status of judges of the categories and concepts used in descriptions and analyses … Rather than employ concepts that are necessarily real, meaningful and appropriate from the native point of view, the observer is free to use alien categories and rules … Frequently, etic operations

> involve the measurement and juxtaposition of activities and events that native informants may find inappropriate or meaningless. (p. 32)

Therefore, establishing a theoretical framework at all, necessarily positions our approach as etic. Moreover, whilst we support the idea of such a framework to be used in self-assessment or peer-assessment approaches, our evaluation efforts (as described later) rely on the ability of a dispassionate 'outsider' to provide an assessment of the work.

Unit of analysis

The work produced by students in this study is of quite brief duration (frequently less than 30 seconds), with few, if any, changes of scene. For our purpose, the unit of analysis is the entire text. Therefore, there is a single global judgement made in relation to each evaluative statement. Since the quality of the work may vary across the text, the rating scale takes into account the possibility of variability, as is now discussed.

Rating scale for design elements

The previous discussion has identified that there are 40 design elements which may be considered. Essentially, we seek a global indication of how frequently in the work has appropriate use of each design element been observed. The starting point is a consideration of how frequently the design element has been deployed in the text, and then to consider whether that use is generally appropriate or is given an 'appropriateness' rating. For reasons of efficiency, a simple scale of 'high', 'medium' and 'low' was chosen as a basis for the rating (elaborated below). When we take into account the realities of work by young, inexperienced authors, our experience has suggested that two additional degrees of delicacy be added, concerning 'incompleteness' and 'distraction' which are described in due course.

This leaves open the question of how to make a judgement about 'quality work', or the

basis by which an evaluator may distinguish between ‘high’, ‘medium’ or ‘low’ for any design element. This is a vital consideration. In principle, it would be possible to establish a rubric by which an evaluator might work. With each design element, and the conventions applicable, being logically discrete this implies not one but up to 40 rubrics, the presentation (let alone development) of such a tool would mitigate against the practical usability and relative expedience of the evaluation. This would be made even more complex when one considers that there may reasonably be different expectations for shorter texts compared with longer ones and the fact of design elements combining to create meaning overall. The functional social semiotic perspective derived from Hallidayan linguistics provides for a rich rather than a reductionist understanding of text. We thus made the decision not to scaffold the evaluation in extreme detail. Rather, we make the assumption that the evaluator is familiar with the relevant semiotics and works under the general brief to look for meaning being made in each of the eight categories of meaning (Tables 2 and 3). The desirable 'frequency' with which a design element might be presented in a text will vary considerably from one design element to another. For instance, it may be quite effective for all camera distances to be close-ups. It is less likely that if all of the camera work were mid-shots that this would be effective, but it might take only one sensitively constructed close-up amidst an extended range of mid-shots for the camera distances to be rated as ‘high’. Thus we leave the assignment of ‘high’ ‘medium’ or ‘low’ to the professional judgement of the evaluator supported by the assessor guidelines (appendix 2).

Refining the principal consideration of ‘appropriate use’, we found it necessary to introduce a degree of delicacy to consider “To what extent should more have been done?” - the ‘incompleteness’ rating. The rationale for this is that student work may actually be incompletely thought through or implemented. For instance, a ‘foggy night’ might be

mentioned in narrative or voice-over, but not attempted visually; or there might be careful attention to detail of light/sun colour and direction in one time and no apparent concern for this later. Of course, both of these could be a deliberate choice of how to deploy the semiotic systems available, but it is more likely to be indicative of incomplete work arising a lack of time, attention or review. It is also a recognition that the unit of analysis being the whole text is very broad and that a design element might be quite well executed overall, but elements of incompleteness or inconsistency would still be present. Therefore, an incompleteness rating of 'high', 'medium' or 'low' or 'not applicable' is introduced. As is shown in table 4, the four-point 'incompleteness' rating subdivides the three-point 'appropriateness' scale to create a 12-point scale.

Appropriateness	L				M				H			
Incompleteness	H	M	L	NA	H	M	L	NA	H	M	L	NA
Overall score	1	2	3	4	5	6	7	8	9	10	11	12

Table 4: A basic rating scale for each design element in use

Further, we found it necessary to introduce a second level of delicacy to consider "To what extent has distraction been observed?" - the 'distraction' rating. This was included to take into account what we had already observed, informally, in the texts produced by young, inexperienced authors. Consider, for instance, a clown appearing unbidden into a desert scene, most likely because the student was experimenting with the clown and forgot to delete him/her, or because they thought it was funny or interesting (in the way that only an 11-year-old can!). Alternatively, a hippopotamus seen amongst the Australian animals in an Australian outback scene in the retelling of an indigenous story would be considered a distraction unless the hippopotamus was part of the story. It seemed to us that in order to take

into account the realities of student-developed texts, ‘incompleteness’ would sometimes be an insufficiently strong criticism, and that even with ‘incompleteness’ identified the text would (by definition) still be rated in the same main band. With these considerations in mind, we introduced a four-point judgement (‘high’, ‘medium’ or ‘low’ or ‘not applicable’) relating to ‘distraction’, which we see as a way of strengthening the ‘inappropriateness’ rating when necessary, and indeed the two are very closely related. We structured the rating scheme so that the ‘distraction’ rating could not be higher than the ‘incompleteness’ rating. In other words, a text could have low levels of distraction as a component of a modest level of completeness, but high levels of distraction can not be logically associated with low levels of completeness. The full rating scale is presented in Table 5. It both modifies the basic (appropriateness) rating and effectively adds a 'very low' band (score of zero) to the initial three-band scale. To clarify the earlier example: where only a small number of sound effects are used, but each of them is a poor choice, the basic rating must be a 'low', but the application of the distraction rating places them in the 'very low' band.

Appropriateness rating		L				M				H			
Incompleteness rating		H	M	L	NA	H	M	L	NA	H	M	L	NA
Distraction Rating	NA	1	2	3	4	5	6	7	8	9	10	11	12
	L	0	1	2		4	5	6		8	9	10	
	M	0	0			3	4			7	8		
	H	0				2				6			

Table 5: The complete rating matrix
illustrating how ‘appropriateness’, ‘incompleteness’ and ‘distraction’ combine to generate an overall rating; a blank is an invalid combination

In summary, the broad rating scale is a simple ‘high’, ‘medium’ and ‘low’ one, which has been elaborated to take into account the practical realities of working with young,

Volume 13, Number 3: December 2012
ISSN: 1535-0975

inexperienced authors/creators along with some inherent difficulties with treating the whole text (albeit a short one) as the unit of analysis. There is a strong hierarchy in applying the rating scales, which is reflected in the way the numerical ranking has been assigned (see tables 4 and 5). In particular, an evaluator will:

1. First consider "is consideration of this *[the design element]* a necessary inclusion?" If it is not, and there is little evidence of it, decide not to include it in an overall judgement of the design element.
2. Where it is a necessary inclusion, consider "how appropriate was the deployment of *[the design element]* within the category being considered?" This is the foremost consideration, and provides the basis for an 'appropriateness' rating. It is an 'impressionistic weighted average' of the semiotically appropriate use of the design element.
3. Then ask her/himself "is there much scope or necessity for doing more with *[the design element]*?". This is the basis for an 'incompleteness' rating.
4. And finally as him/herself "was there anything that distracted me in how *[the design element]* was exemplified?" This is the basis for a 'distraction' rating.

The highest possible rating on a design element is for one that has been used extensively, is used for good semiotic effect and there are no obvious instances of needing to 'do more' or of 'distraction'. Colour and lighting is an inevitable inclusion, and would probably be rated at the highest level as long as there was some variation to capture changing mood or the passage of time. The lowest rating is for a design element which has been used very little, but is highly distracting, for which an obvious example would be where sound effects are rarely used but are always inappropriate sound effects. Items which might fall mid-range on the scale would be a playground scene which is sparsely populated by people, playground

equipment, flora or fauna, but those few which have been included are quite suitable. Thus we have a means of providing an impressionistic rating for all design elements which is useful despite the different ways in which the design elements interact with construction of the text as a whole. The method assumes that the evaluator is familiar with the design elements and relevant conventions, but guidelines are also provided (Appendix 1).

Combining individual ratings into a rating for each category of meaning

The objective is to arrive at a global judgement of the effectiveness of each category of meaning. The above rating scale allows for a rating of each of the design elements in use, and these need to be combined into an overall rating for the respective semiotic system. This is done on the basis of an arithmetic mean of the rating derived from table 5. This is illustrated in tables 6 and 7, which consider the category of 'setting and location'. Table 6 illustrates how this is achieved when the evaluator has determined that all design elements should be considered, and Table 7 illustrates how this is achieved when the evaluator has determined that only certain design elements are relevant.

Design element	Appropriateness	Incompleteness	Distraction	Score
Choice of location	H	N	N	12
Mood and atmosphere	H	N	N	12
Temporal location: time of day, season, era, etc	M	M	N	6
Material location: environment, objects, inhabitants	H	L	N	11
Material processes: animation of elements	M	M	L	5
Narration &/or dialogue	L	N	N	4
Sound effects	M	H	L	4
Background music	L	L	L	2
Overall rating = Average of codes present = (12+12+6+11+5+4+4+2)/8 = 7				

Table 6: Aggregating scores – all design elements relevant

Design element	Appropriateness	Incompleteness	Distraction	Score

Choice of location	H	N	N	12
Mood and atmosphere	H	N	N	12
Temporal location: time of day, season, era				
Material location: environment, objects, inhabitants	H	L	N	11
Material processes: animation of elements	M	M	L	5
Narration &/or dialogue				
Sound effects				
Background music				
Overall rating = Average of codes present = (12+12+11+5)/4 = 10				

Table 7: Aggregating scores – sub-set of design elements relevant

The approach of using a non-weighted average of each of the design elements in use is consistent with the 'etic' and 'broad-brush' approach identified above. It is assumed that each design element in use is of equal importance to the meaning being conveyed through the particular semiotic system. Any discussion of relative importance would need to be developed separately as a close-up qualitative discussion of the text. Furthermore, it does not permit any consideration of what an evaluator might think that could have been used – the text stands on face value. This is one of the reasons for including the category of 'is sufficient information communicated to tell a story'. Consider the case of portraying a desolate outback scene: maybe the author/creator meant to show tumble-weeds rolling across the scene, but found it too difficult or time-consuming to do, meant to have a sound effect but encountered technical difficulties, or maybe never actually through at that level of detail. An evaluator taking an etic stance would neither have access to this information nor pay any heed to it – s/he would only be able to make the judgement that there were no sound effects (therefore rated as 'not applicable') and 'more could have been done' with the material location (therefore probably rated as 'high').

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Interpreting numerical results

As it should be clear, an instrument developed on the above rating scales is capable of generating a vast range of numbers. Whilst some categories (e.g. 'point of view') consist of only one item and thus a score which is a whole number between 0 and 12 will be generated, other categories (e.g. 'location and setting') consist of several items, and thus generating a score which may subdivide the 12-point scale into 60 or more subdivisions. Such finesse is inconsistent to the general broad-brush approach, but equally rounding to the nearest whole number is an unnecessarily crude approximation and would mitigate against any assessment needing to pay attention to any more than one or two design elements in each category. In light of these considerations, we have made an arbitrary determination that the values for the rating of each category of meaning will be rounded to the nearest 0.25.

Implementation

For convenience, the evaluation instrument was set up using Microsoft Excel (Figure 1). In this way, an entry was only required for each of the columns ('should it be considered', 'appropriateness', 'incompleteness' and distraction) for each design element, and the correct value (Table 5) calculated automatically. The validation rule that the 'distraction' rating could not be higher than the 'incompleteness' rating was also automatically implemented, along with the calculations ensuring that only the design elements in use were included in the computation of a total score (c.f. Tables 6 and 7). Some time-saving strategies were also included, such as if there was no entry for 'incompleteness' or 'distraction' it was assumed to be 'not applicable'.

Figure 1: The Evaluation Instrument

		Should this be **CONSIDERED** in this text? (N, Y)	How frequently in the work has **APPROPRIATE USE** been observed? (H, M, L)	To what extent should **MORE HAVE BEEN DONE** in this respect? (H, M, L, N)	To what extent has **DISTRACTION** been observed? (H, M, L, N)
Setting and location	**Rating shown here**				
	1.1 Choice of location	Y			
	1.2 Mood and atmosphere	Y			
	1.3 Temporal location: time of day, season, era, etc				
	1.4 Material location: environment, objects, inhabitants, etc				
	1.5 Material processes: animation of elements in 1.4				
	1.6 Narration &/or dialogue				
	1.7 Sound effects				
	1.8 Background music				
Participant Selection/ Construction	**Rating shown here**				
	2.1 Material composition of a participant				
	2.1.1 Base choice of participant	Y			
	2.1.2 Color of participant, clothes, etc	Y			
	2.1.3 Relative size and shape	Y			
	2.1.4 Animation				
	2.2 Narration &/or dialogue				
	2.3 Sound effects assigned to a character				
	2.4 Background music assigned to a character				
Arrangement and interaction	**Rating shown here**				
	3.1 Physical placement				
	3.2 Physical arrangement				
	3.3 Material processes of participants (interaction)				
	3.4 Narration &/or dialogue				
	3.5 Sound effects				
Sequencing of information	**Rating shown here**				
	4.1 Sequencing of scenes (visual mode only)				
	4.2 Ordering of shots (visual mode only)				
	4.3 Pacing	Y			
	4.4 Narration &/or dialogue				
	4.5 Sound effects				
Viewer stance	**Rating shown here**				
	5.1 Point of view	Y			
The selection of visual information (framing)	**Rating shown here**				
	6.1 Camera distance	Y			
	6.2 Hide/Reveal				
The angles through which visual information is seen	**Rating shown here**				
	7.1 Vertical camera angles	Y			
	7.2 Horizontal camera angles	Y			
The movement of the viewer with respect to that which is viewed	**Rating shown here**				
	8.1 Camera movement (eg. zoom, tilt, pan, track and fly)				
Multimodality	**Rating shown here**				
	9.1 Collaboration between aural/verbal/visual	Y			
Other media	**Rating shown here**				
	10.1 Use of on-screen text				
	10.2 Titles, credits, etc				
Technical innovation	**Rating shown here**				
	11.1 Significant technical innovation which contributes to the telling of the story				
			How frequently are the conventions associated with the structure of the genre observed? (H, M, L, N)		
Structure of the text	**Rating shown here**				
	12.1 Is sufficient information communicated to tell a story				
	12.2 Orientation				
	12.3 Complication				
	12.4 Evaluation				
	12.5 Resolution				

Volume 13, Number 3: December 2012
ISSN: 1535-0975

The study

Participants

Over a period of a school year, we have worked with 17 upper primary school classes (i.e. children mainly between the ages of 10 and 12), their teachers and the students. School A (4 composite year 5/6 classes) was a government school in rural Victoria; School B (3 year 5 and 3 year 6 classes) was a government school in metropolitan Melbourne, Victoria; School C (one year 6 class) was a government school from semi-rural Tasmania; School D (1 year 5 class and a composite year 5/6 class[3]) was a government school in metropolitan Melbourne, Victoria; and School E (two year 5 and two year 6 classes) was a Catholic school in metropolitan Melbourne, Victoria. These teachers had volunteered to participate in a year-long program of introducing 3D multimodal authoring to their classes. The maximum number of multimodal texts which could be collected was 350.

Selection of texts

Teachers of each of the 16 classes were asked to identify the five best texts in their class, using professional judgement and broadly based on the student's attention to multimodal design. They were also asked not to be too pernickety about the selection. For instance, if they could not distinguish between the top seven (and from then there seemed to be a decline in quality) to select all 7. In total, 81 texts were identified by their teachers as the texts of highest quality, as described in Figure 2.

Evaluation and moderation processes

Two experienced teachers were employed to evaluate this corpus, and were provided with three hours of initial training and continual access to the researchers for advice. Texts were

[3] A team-teaching arrangement meant that both classes were, in essence, taught by the same teacher, so we refer to '16 teachers' throughout.

allocated to each review in a stratified random fashion, such that both evaluators saw examples from each class. A strict regime was established to ensure comparability in the work of both evaluators:

- work through the body of work 10 texts at a time
- each evaluator chooses a group of texts 10 texts from those they have been allocated
- each evaluator independently assesses the texts in the batch of 10 as per the evaluation instrument
- each evaluator chooses a "high", "medium" and "low" text for the two major evaluation categories 'elements present and observable' and 'elements as shown to the viewer'[4]
- this moderation sample is provided to the other evaluator for blind assessment
- the results from the two evaluators are compared for each text; to be 'sufficiently similar' the evaluator's results need to be with 1 point of each other
- where a difference exists, the two evaluators held discussions to achieve an agreed position[5]
- each evaluator makes changes to any of the other assessments based on that discussion
- this process is repeated until the entire batch of texts is processed

Each evaluator entered their assessments on an Excel spreadsheet (one spreadsheet for each text). The use of the instrument, as implemented in Excel, has been found efficacious by the assessors, allowing them to assess each text (of approximately one minute duration) within 20 minutes. Using an Excel macro, the results were subsequently aggregated onto a single

[4] These may overlap; so at worst case there are six texts chosen, at best three.

[5] If a position could not be arrived at, the process was to refer the matter to the research team, but in practice, the research team did not need to become involved at this stage of the process.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

spreadsheet for subsequent analysis.

An aggregated score

With the overall objective of identifying 'high performing' classes, an aggregated score was computed to allow easy (but admittedly broad) comparison between classes. This aggregate score was calculated from that of the nine categories of meaning: those related to 'creating the world' (table 2), those related to 'showing a world' (table 3) and 'text structure'. That is, the scores for the non-essential component of 'other media', the non-semiotic 'technical innovation' and the more broadly interpreted 'multimodality' were omitted.

Inter-rater reliability

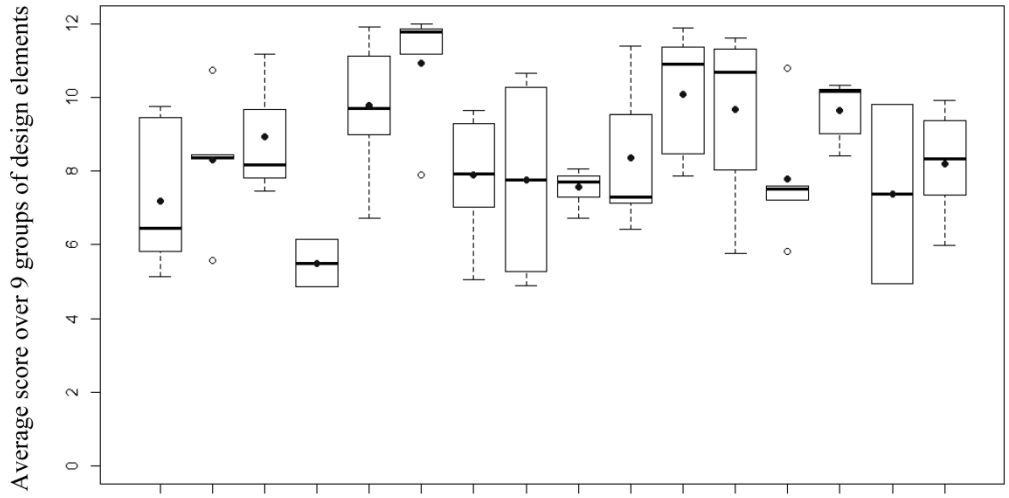
Several aspects of our work served to establish inter-rater reliability for the evaluators: the provision of the detailed evaluation guide, the training process for evaluators and the careful moderation process. Prior to proceeding with any further analysis, it was important to establish whether the results from one evaluator on the aggregated score could be distinguished from that of the other. In particular, using the statistical package *R* (R Development Core Team, 2012) the Mann-Whitney *U* test (Cohen & Lea, 2004, pp. 199-255) was applied to test the hypothesis that the sample from each evaluator has the same mean rank. The results for each evaluator for the aggregated score for the design elements has $p > 0.05$, thus the null hypothesis that the samples have the same mean ranks is not rejected, and so the results submitted by one evaluator cannot be distinguished from that of the other. This result enhances our confidence in inter-rater reliability, and further discussion and analysis has proceeded on this assumption.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Identification of high performing classrooms

Again using *R*, a box-and-whisker plot (Cohen & Lea, 2004, pp. 24-25) was used to present and compare the rating of aggregate scores for each class, as shown in Figure 2. On this figure, the median value is shown by the solid line and the solid dot shows the mean, the extent of the box describes the interquartile range. With a small sample from each class, the whiskers (which are designed to give a fair indication of the range of scores) and the outliers (shown by an open dot) add little to the meaning, except to indicate that the spread of results is fairly wide in some cases (A1, B1, B4, B6, D1, E3, E4). Visual inspection shows that performance of the texts selected from classes B1, B2, C1, D1 and E2 is quite striking.

Not only do the scores average in the 'high' range (i.e. greater than 9), but these are the only cases where the mean is distinctly less than the median. This indicates a left skewness, or more descriptively, there is a 'hump' of data at the top end. So whilst there were some texts in most other classes which performed quite well, the 'hump' is towards the lower end and would be so, even if the remaining 20-or-so texts from those classes were considered, as the best of them have been taken into account. We thus regard this set of five classrooms as 'high performing' because (a) the average scores are the highest of any (b) they are the only ones presenting as left skewed and a very high proportion of the best texts in this sample are found in these classes.



School:	A	A	A	A	B	B	B	B	B	B	C	D	E	E	E	E
Teacher:	1	2	3	4	1	2	3	4	5	6	1	1	1	2	3	5
Year Level:	5/6	5/6	5/6	5/6	6	6	5	5	5	6	6	5/6	5	5	6	6
No of texts:	6	5	3	2	7	7	8	4	6	5	5	8	5	5	2	5

Figure 2: Box plot comparing the performance of all classes

The boxplot shows the median by a solid line, the box indicates the interquartile range, and the mean is shown as a solid dot.

One needs to be careful in making assertions about what this might mean because the sample collected from each class is much too small to make any assertion about how the other texts from each of these classes may have performed. They could just as reasonably be evenly distributed along the whole continuum as clustered towards the top or the bottom of the scale. In the worst case, the distribution from each class would be bipolar, with a small sample of 'high quality' texts at the top and the remainder at the very low end; at best, they remainder accentuate the skewness already identified. Either way, it cannot be denied that the best texts in the sample will be found in those classes. By implication, then, we assert that there is something unique occurring in these classrooms. With a wider objective of developing an effective pedagogy of multimodal authoring, there is something to be taken notice of in classrooms such as these which can be investigated through different research methods (such as case study).

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Discussion

Research into both multimodal pedagogy and the evaluation of students' multimodal texts is dominated by in-depth understandings of a small number of cases (Chandler-Olcott and Mahar 2003; Hull and Nelson 2005; Luce-Kapler 2007; Macken-Horarik and Adoniou 2008; Tan and Guo 2009; Mills 2010). The lack of ability to make broad assertions across a range of situations is a weakness. Whilst far from large-scale research, we have nevertheless been able to collect data from 17 classes comprising nearly 350 students, subject it to an evaluation method, and use that to identify specific classes to which greater attention might be paid. All these aspects are eminently scaleable to larger research ventures. Moreover, it allows for a dispassionate identification of classes which might be attended to in more detail. For instance, other parallel work (Thomas, 2011a, 2011b) would suggest that classes B2 and C1 would shed important light on multimodal authoring, while this data suggests that further examination of classes B1, D1 and E2 may be similarly illuminating. A close-up investigation of these classes is beyond the scope of this paper, but what we have sought to demonstrate is a proof-of-concept which can productively inform further work where the selection of classes is important.

There is an important caveat in relation to this group of 'high performing' classes, which arises from our observation of classes. It is this: it would be rash to think that the identification of a class as 'high performing' is solely related to depth or breadth of knowledge about meaning-making with multimodal texts. We have noted a range of inter-related factors which impact on that outcome: technical concerns which the school did not have any control of (i.e. bugs or consistencies within the software); technical concerns which the school might have been able to control, but for access to adequate technical expertise or resources (i.e. software installation or network performance issues, adequate numbers of

Volume 13, Number 3: December 2012
ISSN: 1535-0975

working computers); and classroom time-management issues, when the units of work took a much longer time than was estimated by the teachers. It is clear that something 'special' happened in some cases, but it is not possible to readily separate out circumstances which were strongly influenced by 'practical' concerns from those which arise from a high level of knowledge of the meaning-making strategies of multimodal authoring. Thus, a close-up investigation of 'high performing' classes may well tell a wider story of schooling, infrastructure, technology, support, collegiality and pedagogy.

Based on the success of the evaluation instrument to effectively discriminate between classes, its application to related endeavours is apparent. For instance to compare the performance on each category of meaning, and to consider whether student performance on each category of meaning is correlated with, or independent from, each other category. Such investigations could helpfully further inform a pedagogy of multimodal authoring.

Conclusion

The work described here sought to develop of an instrument that would facilitate the assessment of large numbers of multimodal texts produced by middle years students. This has been described in detail. At its core, a fairly simple idea has been implemented: identify a text as performing 'high', 'medium' or 'low' on 12 semiotically-derived criteria. To allow for ready comparison between texts, a range of numerical assignments, averages, aggregations and roundings have been applied. Through the trialling the instrument and all its computations in a meaningful investigation we have demonstrated a proof-of-concept, that such machinations do not reduce, summarise or dilute the data to a point that is ultimately unhelpful. That is demonstrably not the case. Through this approach, inter-rater reliability has been sustained, and the summary data can meaningfully distinguish between classes on the basis of the quality of the texts produced by the students.

Volume 13, Number 3: December 2012
ISSN: 1535-0975

Whilst we are encouraged by the success of the evaluation instrument, it is not a complete or final work in itself. Further development at both the theoretical and practical level are inevitable. Perhaps the most challenging conceptual issue is to better address collaboration between the modes, and perhaps the largest practical issue is the extent to which a 'distraction' rating is in fact an important inclusion. We have described a range of applications of this evaluation instrument, and present it as a work-in-progress which will contribute to understanding student construction of multimodal text and thus developments for effective multimodal pedagogy. The availability of instruments such as this will play an important role in the up-scaling of research ventures in this field.

Appendix 2: Evaluator Guidelines

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
Setting and location	Choice of location	Does the choice of location: Form a good basis for presenting the facts? Form a good basis for the mood and atmosphere desired? Form a good basis for the time/season/era desired? Permit appropriate choices with respect to a 3D capacity, and what might be desired in terms of the movement of participants, props, set dressing or the camera?
	Mood and atmosphere	Consider lighting, colour, fog and other special effects for mood and atmosphere. Consider the contribution of set dressing towards the mood and atmosphere.
	Temporal location (time of day, season, era, etc)	Some ways to achieve this might be: lighting (including intensity, direction and colour), the palette of colours used, the use of props or costumes, the use of set dressing and 'extras'. For instance, the presence of dinosaurs (an 'extra') would indicate an era as would a particular style of dress; events in a living room around an open fire may indicate evening. Considering the temporal location might not always be relevant because the choices situate the text somewhat nondescriptly, and this proves to be unimportant in relation to the meanings being conveyed (e.g. some retellings of nursery rhymes).
	Material location (environment, objects, inhabitants, etc)	In other words, the 'set dressing' and 'extras' (people) brought into the location for purpose of establishing the setting and location. Their purpose in helping establish location and mood are addressed above; here we are concerned with whether they "make sense". This includes such issues as whether explosions are used without apparent purpose or finding African animals in an Australian scene. (These are not the "things" which the story is "about" - see 'participant', below).
	Material processes (animation of environment, objects, inhabitants, etc)	This draws our attention to animations which should apply to set dressing and extras. If we want to convey the idea that "in the background, there was a koala is climbing the tree", we would animate the koala to actually climb the tree.

	Narration &/or dialogue	To include both the “sequence of words” and the performance of these. One approach to this is for a narrator to directly introduce the location of the story in time and in space, for instance “Once upon a time, but not very long ago, deep in the Australian bush lived two possums”. In dialogue, participants may make reference to location in time and space, which may be difficult to do visually, for instance “It’s been ten years since the war finished and we’re still living in this bomb-damaged hovel in worst suburb in east London”. A broad context could be provided verbally and then use the visuals to construct the immediate local context or juxtaposition.
	Sound effects	Sound effects may be used to convey information about temporal location (time/season/era), material location (the "things" in the location may be heard as well as seen, or heard instead of being seen) and physical movement (non-specific discussion between two people in the background may obviate the need to make them look as though they are talking).
	Background music	Music may be used to convey information about temporal location (time/season/era) and setting. For example, asian-style music helps establish the setting and medieval-style music would help establish an era.
Category of Meaning	**Design element**	**Guidelines for considering the design element and the applicable conventions**
Participant Selection and Construction	Material composition of a participant: Base choice of participant	The author/creator must choose the base participant, and whilst the subsequent change to colour, swatch, size, animation, etc can significantly impact on the basic object chosen, it still needs to be broadly suitable for the purpose for which it is appropriated. For instance, the use of a rhinoceros in an Australian scene is almost certainly inappropriate, regardless of how it is modified.
	Material composition of a participant: Color of participant, clothes, etc	The author/creator must choose whether the colourings/ swatches of the base participant are those which tell the story effectively. If not, then modification to the colour of the skin, hair or clothes should be made. For instance, a base participant may be a dancer, but because of positioning and colour of clothes may be made to look like a swimmer. A plain brown bird can be made to look like a magpie with appropriate swatching. A participant may be made salient by wearing a red shirt, or implicitly grouped with others as a family because they all have clothes swatched the same colour.

	Material composition of a participant: Relative size and shape	The author/creator must choose whether the size and shape of the base participant are those which tell the story effectively. If not, then modification to the shape and size of the participant should be made. For instance, an egg may be the size of a hen's egg, relative to other participants, but should be made larger because an ostrich egg is under consideration, or needs to be more prominent. A story of a 'roly-poly policeman' needs to show someone who is not as thin as a rake.
	Material composition of a participant: Animation	This is the use of internal animation to show more about "what the participant is like" or "how the participant interacts with others" than would otherwise be apparent through the base participant alone. It might also be keypointed animation in the sense of conveying that someone has a limp, a strong throwing arm or an elegant dancer.
	Narration &/or dialogue	Voice performance (in particular, words of dialogue 'from' the participant, 'to' the participant or narration 'about' the participant) may be used to show more about "what the participant is like" or "how the participant interacts with others" than would otherwise be apparent through the visual presence of the participant alone. This includes both the "sequence of words" and the performance of these. For instance, a gruff voice or being spoken about in sarcastic tones. Very occasionally the participant may not be visually present at all, but known to the viewer only through sound effects and voice performance.
	Sound effects assigned to a character	Sound effects may be used to show more about "what the participant is like" or "how the participant interacts with others" than would otherwise be apparent through the visual presence of the participant alone. For instance, heavy footsteps or burping. Very occasionally a participant may not be visually present at all, but known to us only through sound effects, possibly by giving a participant a 'signature sound'.
	Background music assigned to a character	The possibilities are limited. An example would be giving each participant a signature theme, such as in Prokofiev's 'Peter and the wolf'. In that way, "what the participant is like" or "how the participant interacts with others" can be conveyed more richly than would otherwise be apparent through the visual presence alone.

Category of Meaning	**Design element**	**Guidelines for considering the design element and the applicable conventions**

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
Arrangement and Interaction of participants	Physical placement	This refers to how the participants/objects are placed "physically". For instance, do participants who are supposed to be standing on the ground look like their feet are actually on the ground? This category focuses our attention on whether there are "problems" of this type, or whether it has been handled relatively well. Whilst in theory participants are always located physically, sometimes this is not a relevant consideration, for instance in a series of close-up shots it may not matter if physical positioning has flaws or not. Also consider whether necessary “re-adjustment” of physical placement has been managed well. For instance, a base participant may be a dancer, but because of positioning and colour of clothes may be made to look like a swimmer.
	Physical arrangement	This refers to the "actual" layout. It is more likely that the viewer will see what the camera wants us to see, rather than what is really there, which is addressed in the 'apparent visual layout' (below). But just in case there is a shot from which the viewer can correctly determine the "actual" layout, this is where it should be judged. Have there been, for instance, deliberate use of centre/periphery or ideal/real, new/given? Particular gazes, animations or vectors to connect the people/objects in the scene?
	Material processes of participants (interaction)	In this, we are concerned with: how the participants move "actually" (i.e. in a ball-room scene, it would be conveyed that who participants are dancing together because they are seen to move towards each other and are animated with dancing gestured), varying social relations between participants, or participants and a viewer, varying salience - changing which participant is highlighted by change of positioning from one moment to the next. There may be times when interaction is not a relevant consideration, for instance if there is only one participant. (Note that the physical movement of props, set dressing etc is separate, as above).
	Narration &/or dialogue	This includes both the “sequence of words” and the performance of these. Same kind of issue as above - more likely to show via image construction.
	Sound effects	The presence of sound effects, dialogue or narrative may identify other participants who may or may not be clearly identified otherwise, and whose action in relation to others may not otherwise be identified. For instance, a presumed off-screen golfer yelling "fore!" prior to a golf ball knocking a participant to the ground.

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
Sequencing of information	Sequencing of scenes *(visual mode only)*	The scenes are actually in the correct (narrated/logical) order The (implied) time sequence is sensible. For instance, if a closing scene is depicted as late afternoon, it would be expected that scenes apparently occurring earlier in the same day would be shown in daylight rather than dark.
	Ordering of shots *(visual mode only; must of have least one scene with two shots)*	The normal state of affairs is for one shot to show one action/transaction/event, and the next shot to show the next one ('temporal sequentiality'), with other possibilities such as 'temporal simultaneity', 'flashback')
	Pacing	A very literal understanding of pacing is meant here. For instance, the text might identify a participant through a close-up shot, but the camera might 'wait' on that participant for insufficient time for the viewer to make the connection that a participant has been identified. Alternatively, the text might move too slowly – the author has not seemingly made adjustments to the duration of the scenes/shots to adequately reflect the mood or atmosphere otherwise intended.
	Narration &/or dialogue	This includes both the "sequence of words" and the performance of these. Narrative or dialogue could be used to provide information of events intervening between one scene and another so that the verbal information was what maintained continuity.
	Sound effects	Examples are a clock striking 'on the hour' which to show an appropriate progression of hours, or the sound of a train "off stage" signalling that either someone had departed or was about to arrive.

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
Viewer stance	Point-of-view	The point of view conventions are: • The 'default' position is that of external observer with no connection to the action. The viewer is positioned to see what is happening. • Directly as the viewer, for example through the position of the camera which places the viewer in amongst the action. • Along with character where the viewer is positioned with an over shoulder view, or close behind or beside the character seeing part of the body, but also seeing what the character is seeing. • As a character first person point of view, for example indicated by hands/feet/shadow in view to indicate the camera is 'someone'. First person point of view can also be established through a shot- reverse shot sequence which infers the viewer is seeing the action as a character. Shot one shows the action from a characters point of view, shot 2 shows the characters reaction. This can also work in reverse.

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
The selection of visual information (framing)	Camera distance	Camera distance is used to portray various degrees of social distance through wide shot, mid shot, close up or extreme long shot.
	Hide/Reveal	Hiding/revealing is concerned with: • disclosing certain information which is actually 'in the scene' yet keep other information hidden (ie hide/reveal) • viewing a group in such as way as to infer that they are grouped together (whether they are nor not). For instance, if 3 people are sitting around a table, it can be inferred that two of them are 'close' and the other excluded.
Angles through which visual information is seen	Vertical camera angles	Vertical camera angles are used to portray various degrees of social power, especially between the viewer and the participant. For instance, the use of eye-level, low angle, high angle, bird's eye view. These also imply some sense of point-of-view.
	Horizontal camera angles	Horizontal camera angles are used to portray various degrees of involvement, especially that between the viewer and the participants. For instance, the use of frontal angle, oblique angle, back view or bird's eye view.
Movement of the viewers with respect to that which is viewed	Camera movement	The codes here are zoom, tilt, plan tracking and fly. These can be used to use to dynamicize social distance, social power and involvement Also consider: how the speed of camera movement can influence meaning whether a filmic cut would actually be more appropriate
Multimodality	Collaboration between visual/verbal/aural	In other words, it shows rather than tells. It is essential to refer to "whether sufficient information is communicated to tell the story"; there must be sufficient information in various modes actually communicated before a judgement can be made with respect to this. An example of a collaboration: a 'composition conjunction' would show disparate activities, but because of their temporal sequence, we understand them as similar or related. A consistent voice over (or continuity of music) could confirm this.
Other media	On-screen text	One must be reasonably sure that the use of an audio track would not be a better option, but since on-screen text is available this is the place to make judgements about it.
	Titles, credits, etc	Consider the choice of font style, colour/s, size and position on the screen for the titles and credits, work with or support the story genre, as well as enhance the aesthetics or look and feel of the text
Technical innovation	Significant technical innovation	Some examples may be: Sophisticated grouping/swatching to produce space ships, creating rain in a scene, creating a shadow

Category of Meaning	Design element	Guidelines for considering the design element and the applicable conventions
Structure of the text	Is there sufficient information to tell a story	The viewer is given enough relevant information about what is happening in this story for it to make sense.
	Orientation	Orientation is the introduction of the characters, location in time and space and identification of any key elements of context significant for the story.
	Complication	Complication is the problem or issue that arises that disrupts the routine that normally prevails.
	Evaluation	Evaluation is the participant's reflection or judgments about what is happening (to them).
	Resolution	Resolution is the solving of the problem, resolution of the issue, return of the situation to normalcy or a new equilibrium.

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