From Multimedia to Multiple Voices
Conflicts in Collaborative Learning Cultures

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Informal Learning and Digital Media
Digital repertoires of learning: aesthetics, genre and the meaning of context

Abstract
This chapter discusses the role of collaboration in formal and informal learning environments and the challenges posed by the use, reuse, and appropriation of different types of media. We conducted an after school program in which students participated in collaborative digital story telling activities. In these activities, they often shared one another's ideas, media, and plots, but were unsure of how to give credit and to one another's ideas. I suggest Mikhail Bakhtin's theory of dialogism to describe the factors that contribute to students' ideas about how ways in which they can collaborate in classroom activities. I propose that when students perceive a classroom activity to foster dialogism, they will be more inclined to explore collaborative learning opportunities. This chapter discusses these tensions using Bakhtin's theory of dialogism to understand how they play out, and how they may be addressed to create positive, collaborative learning environments in the classroom.

Introduction

Over 87% of youth in America between the ages of 12 and 17 use the Internet and usage spikes from 60% in the sixth grade to 82% by seventh grade (Lenhart & Madden, 2005). Teens are actively creating blogs and webpages, posting original artwork, photography, stories or videos online and most teens have accounts on MySpace, Facebook, or Xanga. Teens also keep in touch through a vast array of communication tools, such as instant messaging, email, message boards, or chat rooms. This activity, in combination with the increasingly globalized socially networked information economy, indicates a need for researchers, teachers, parents, and policy makers to better understand the influence of these media and activities on the changing dynamics of classroom collaborative culture. In particular, we need a better understanding of the ways in which youths' use of technology in their informal learning environments influences their use in the classroom.

Many of today's new media technologies are highly social in nature. Similarly, youths' uses of these digital media in their informal environments are highly collaborative and communicative as suggested by the popularity of these environments, such as GarageBand, Flickr, MySpace and YouTube. Despite their enthusiasm using computers and the Internet, they express a strong lack of interest in pursuing careers and academic disciplines using computers, technology, and digital media. Youths' perceptions of these tools in formal educational environments are that they are often boring, anti-social, and lacking real world implications (Margolis, 2002). Their lack of interest poses a problem in today's expanding, Internet-based, global economy. Opportunities at companies like Yahoo!, Google, or Electronic Arts reveal that there is a demand for youth to become experts in their use of digital media. The skills required in today's economy include practices related to media remixing, reuse, and appropriation. However, these practices often exist in contrast to the individual nature of much of today's standards-based school curricula. What is considered sharing or appropriating in an informal environment becomes cheating or stealing in a formal environment. In prior work, I describe the role of collaboration in kids' informal activities (Yardi and Perkel, 2007). In this chapter, I expand on this discussion, focusing more specifically on the challenges faced in informal digital media environments versus formal computing classes. The role of computers, technology, and the Internet in our everyday lives is rapidly expanding in unexpected and unforeseen ways. At the same time, educators are encouraging the use of computers and new media in the classroom. As technical proficiency becomes a fundamental skill within a reading and writing curriculum, the nature of how youth should interact in these environments becomes more complex. In this chapter, I explore these conflicting collaborative computing cultures. I frame my argument in Mikhael Bakhtin's theory of dialogism to suggest ways of understanding these emerging mediums and how to design collaborative learning cultures.

Collaborative Storytelling: A Case Study

We conducted a digital media storytelling after school program twice a week for two months (Yardi and Perkel, 2007). Our goal was to determine requirements for an online, collaborative storytelling environment to help youth learn principles of non-linear, narrative construction using multiple digital and physical expressive mediums. The story creation process involves developing ideas and constructing knowledge through personally meaningful forms of self-expression. Recent projects have looked to design interactive storytelling environments to support the creation, production, consumption, and sharing of stories. For example, The POGO environment describes the use of active tools and the performance of the stories to the group (Decoritis and Rizzo, 2002). Similarly, the design of KidPad and Klump centered on the notion of "shoulder-to-shoulder collaboration," as two or more children share an interface in the process of creating a story (Benford, et al., 2003; Hourcade, 2002). StoryMat examines collaboration in storytelling and addresses the importance of the "collective sharing" that allows story producers to "change point of view and acquire a different perspective" (Cassell and Ryokai, 2001). In StoryBuilder, kids can either add a new page to an existing story that has been created by other kids or they can create pages and use an "email to a friend function" to create a shared story with a known group of friends (Antle, 2003). The collaborative process between the kids, as authors, happens during the creation of the story, but the latter method requires direction communication through an existing relationship. Collaboration between kids, as both author and audience, shapes the meaning of the story to both.

In our program, we designed our curriculum to teach fundamental storytelling concepts, with each session focused on a particular theme, such as non-linear narration or character development. We chose storytelling as a valuable and engaging medium through which we could explore the ways kids used digital media to describe the world around them. We conducted hour and a half long sessions, twice a week, at the school's computer lab (see Figure 1). The study involved eight fifth-grade students, five boys and three girls, and a team of five researchers.

Our lead researcher ran each session, with support from the other researchers, who played the interchangeable roles of participant observer, note-taker, videographer, and teaching assistant. We videotaped all the sessions and conducted pre, mid, and post-interviews with the participants. We also conducted formal interviews with each of the participants. Four of the interviews were with individual participants and two of them were in paired groups.

Figure 1. After School Program

Our program was based on Backyard Transformations, a project that was conducted at Apple Computer's Vivarium Research Lab from 1989 to 1990 (Strickland & Wright, 1991). Backyard Transformations combined story construction with collaborative play in a form that encouraged children to be imaginative and creative. The system combined two components: the first consisted of 174 video clips that provided evocative and unusual scenes of characters played out in one of the creator's backyard. The other component was a set of improvisational storytelling games designed to help children learn principles of narrative construction. Children played these games in groups that included a teacher or coach. They used physical "cards" that depicted key frames from the video clips and then used the cards to construct specific activities for developing ideas, sharing, and creating story sequences (see Figure 2).

Sharing Ideas: Collaboration or Cheating?

Storytelling is often perceived as an individual process in which stories are attributed to a single author. However, there are usually many influences that may have contributed to the creation of the story. Walter Ong (2002) described the weaving of stories by ancient rhapsodes who pieced together memorized sections for the benefit of their audience. Explicit references to remixing emerged in the 1970s in context of multi-track music recordings and developed through the 1980s in context of video remixing, such as synthesizing, sampling, and looping (Manovich, 2001). The storytelling process in our program involved remixing, revising, and appropriation of others' ideas. Many new media environments have looked for innovative means to create collaborative storytelling cultures through this type of remixing. For example, Penguin Books created an online remix contest in which they provided thirty classic novels that could be downloaded and creatively recomposed into novel compositions.[1] Our activities fostered a culture that strongly encouraged media reuse and sharing. However, we did not attempt to establish any norms or rules for sharing, attributing ownership, or claiming ideas, artifacts, and stories as one's own. We thus observed that the participants struggled with a sense of uncertainty throughout their evolving storytelling processes. Their acts of sharing and appropriation revealed the tensions between collaboration, copying, and cheating in their uses of various forms of digital media. In our storytelling environment, who owned the components within their story sequences?

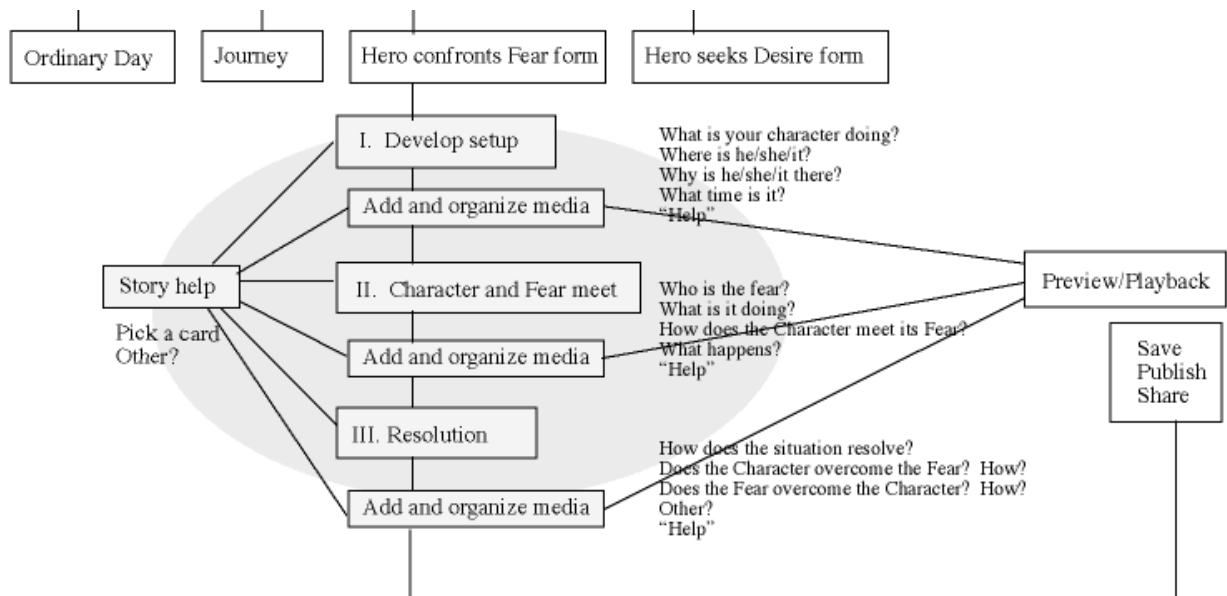[1] Penguin Launch Remix Project. http://www.djmag.com/newsfeat118.php.

Figure 2. Character Building Flowchart

During one session in our project, Toby selected a card from the deck and created Count Whistleboy, an imaginary character based on the image on the card, but with its own unique fantastical and distinct features, which Andrew then used in his own story. Did that act carry the same implications as when Iris used the disposable camera to take a picture of her family cat and uploaded the digitized version to the lab computer, which Dionne then used in her story? When was borrowing a peer's idea collaborating and when was it stealing? We found that our participants preferred to collaborate during the idea generation process, often struggling to produce ideas on their own. For example:

RESEARCHER: What do you like about working with other kids?
ANDREW[2]: I think it would go faster if I worked by myself but Miguel has some good ideas.… Miguel watches a lot of TV and gets good ideas from TV. There's a lot of good ideas on TV.
IRIS: Giving me some ideas. Ideas are basically like all you need.
MIGUEL: I like working with other people better 'cause usually I don't have all the ideas and other people can help.

RESEARCHER: Would you rather work with [other kids] or by yourself?
IRIS: I think it would go faster if I worked by myself but Miguel has some good ideas.
RESEARCHER: What kind of ideas?
IRIS: He said let's put the policeman in the fight but then we tried to do that but it showed the policeman over the robot so you couldn't see the robot. And then we decided to put him after the fight … Miguel watches a lot of TV and gets good ideas from TV. There's a lot of good ideas on TV…

However, while they sought out their peers and other external resources for ideas, they also expressed a desire to be given credit for ideas that were used by others. We frequently heard comments such as "Hey, you stole my idea!" or "That was my idea!"[3] In the following episode, Toby presented his story in iMovie to the group.

TOBY: This is Madame Peacock.
JASON: He stole the idea. He stole the idea!

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[2] Pseudonyms are used to protect the identity of the participants. All media is reproduced with the consent of the participants and their parent(s).
[3] See Yardi and Perkel (2007) for more details.

TOBY: She's crawling because she has no feet. How do I know? I can't see her feet. She is 13 years old. She is small as a squirrel. It lives in a wooden house. Its favorite thing to do is hunt the Invisible Woman…. Their greatest hope is to destroy the Invisible Woman.

JASON: [*under his breath*] Oh come on. [*reaches across the table and points at the screen*] He stole that. [*points finger in Toby's face*] You stole that!

In another similar episode, Toby described a character he had created called Count Whistleboy:

TOBY: This is a human. His name is Count Whistleboy. He is ten years old. He is ten inches tall… and um it dislikes the … the dark… the moon the most because it goes "raar" and becomes a vampire. And um… and um… his friends are his whistles.

JASON: Wait, did you do Count Whistleboy or did you? [*pointing first to Toby and then to Andrew*]

TOBY: I did Count Whistleboy.

ANDREW: So did I.

While tensions dissolved as soon as owner of the idea was given public acknowledgement for his or her idea, character, or artifact, at the same time, their interactions brought to light the potential sources of complexity and confusion regarding the proper uses of shared artifacts and artistic creations. The kids looked to one another as sources of creative inspiration, yet they wanted to simultaneously maintain a sense of individual authorship. While it is important to acknowledge that productive creative activities can occur in isolation, design research studies suggest that "the role of interaction and collaboration with other individuals is critical to creativity" (Fischer, 2005). The romantic notion of the individual author as creative genius was criticized as too centered on the individual (Barthes, 1978) and has more recently given way to notions of authorship as an interwoven system of creative collaborations. Creativity is fostered through the interactions multiple ideas and thoughts and the social and cultural contexts in which they are shared. In this discussion of modern informal remix culture, creative collaborations thus directly rely on the participation of multiple individuals engaged in one or more interactions. These creative environments are valuable because they allow a variety of new and different cultural forms to be created - one artist can comment on another's creativity in ways that the original creator did not anticipate or foresee. This expands the cultural enjoyment because it gives the audience more to experience and enjoy, and it can also inspire new creativity in the original artist. Enabling a culture in which people can comment on and reinterpret the works of others is a powerful form of self-expression.

Our participants expressed a number of ways through which they sought out creative opportunities and outlets: "I don't like that you have limits of characters. I wish you could, like, build characters from your own imagination so you don't have to keep on using the same people." We encouraged this collaborative idea generation by working with them to develop their stories, as well as by encouraging participants to provide feedback on one another's stories. In one case, a researcher prompted Dionne with series of interactive questions about her character, Ms. Laugh A Lot, such as: "How old is she? Does she laugh in her sleep? What is her typical day like? Does she know that she annoys the teachers and other students?" As Dionne developed the character on the whiteboard (see Figure 5), the researcher further probed:

RESEARCHER: Why is her body so small? Other than the fact that it's goofy…

DIONNE: Because she laughs a lot. And as she laughs a lot her body gets smaller… and smaller. And her head gets bigger… and bigger…

RESEARCHER: How does her head get bigger?

DIONNE: Because she laughs and her mouth gets bigger and stretches out her head.

In the following subsequent exchange, Tia then played the role of researcher with Dionne to offer Dionne ideas for her story.

TIA: Well the two things that I don't like is that I think she could encounter more problems in her life. Not just that the only bad thing that happens to her is that her head gets bigger. And… is there anything else about her? Because all you said was that she had a big head, a lot of hair, and a small body.

TIA: And two good things are, I think your character is funny, and I like how her head gets bigger when she laughs. I think that's a good idea.

DIONNE: [*off camera*] Thank you.

We later witnessed Dionne incorporate Tia's feedback into her revised character depiction, writing down Tia's feedback on the whiteboard (see Figure 3) then drawing variations that implemented some of Tia's suggestions. She then approached Tia and asked if the revised drawings were what she had in mind or if she had other suggestions. In this activity, participants had a common understanding that feedback provided by them to their peers gave right to the author or artist to appropriate and incorporate the suggested ideas into their work.

Figure 3: Dionne developing Ms. Laugh A Lot.

How should these practices, which are simultaneously individual and collaborative, be understood when the rules behind the sharing of ideas and artifacts are subtle or unclear? More specifically, what is the role of collaboration in increasingly technology rich classrooms where a culture of remixing and reusing is pervasive? Computer science and technology classes in particular, are becoming core courses in many formal educational curricula, taking their place within the more traditional reading, writing, and arithmetic classes. I suggest that Bakhtin's theory of dialogism provides a useful framework through which to understand the culture of collaboration within these learning environments. In the following sections, I first describe Bakhtin's dialogic theory. I then frame formal computing curricula in the context of dialogism. Finally, I suggest ways of understanding collaboration in formal educational environments and how to promote a culture of collaboration in formal learning environments.

Framing Classroom Culture in a Theory of Dialogism

The perceived dialogic nature of a medium and how it is used in the classroom correlates to whether students will be inclined to use it collaboratively or individually. I use a definition of dialogue as consisting of one or more speakers, listeners, and the relationships among them (Bakhtin, 1981). Bakhtin used the term "utterances" to describe the situated act of dialogic discourse as a unit of analysis (Bakhtin, 1986). I thus characterize dialogue as the inscriptions, implications, and intersections that are embedded within words, texts, gestures, intonations, voices, responses, and other communication utterances. While others have described the nature of dialogue as it occurs between man and machine (Meadow, 1970), I focus on dialogue as it takes place between man and man, where the machine is the mediating agent among two or more humans. It is useful to ground this discussion of these varied learning environments by describing them in terms of categories of genres. Bakhtin described speech genres as characteristic patterns of speech within the realms of dialogue and text (Bakhtin 1986). He distinguished between primary genres, which legislate words, phrases, and expressions that are acceptable in everyday life, and secondary genres, which are characterized by various types of text. Examples of genres vary from simple forms such as greetings, farewells, congratulations, or information about health, to more complex forms such as novels, dramas, or scientific research (Bakhtin, 1986). In our project, genres emerged through the different ways that the kids used the media that we provided for them. Some were simple forms, such as talking, laughing, shouting, and playing. Others were more complex, such as visual art, software-based, acting, and written stories. Bakhtin described literary discourse and individual literary texts as an intersection of multiple textual surfaces rather than as a fixed point or meaning.

Multivocality is defined by Bakhtin as the ways in which multiple voices can be discerned in a text (Bakhtin, 1981). The role of multivocality in collaborative learning spaces is less clearly understood in these emerging new mediums. What happens when there are multiple voices, listeners, and possible interpretations in a given utterance? A speaker's utterance, as a type of message, has historical roots in oral storytelling. However, what implications does the speaker's original ownership have as the utterance evolves through multiple dynamic and untraceable states? According to Bakhtin "Language is not a neutral medium that passes freely and easily into the private property of the speaker's intentions; it is populated–overpopulated–with the intentions of others" (Bakhtin, 1981). One of the challenges we faced was that, in contrast to text and language, which offer a more binary distinction between speaker and listener (although they are not always explicitly delineated), the boundaries are less obvious when the utterance continues to be used and reused beyond the speaker's original intention, as was the case in our multimedia environments. Multiple layers of meaning are added and interwoven as the utterance is appropriated throughout its lifecycle. Perhaps the sender's original message remains embedded somewhere in the medium but it will become convoluted and masked over time. The ability for messages to be mediated through both the students and the medium can influence the ways in which its dialogism evolves. What are the roles of the sender and receiver within these mediums?

In our study, for example, Miguel discovered an obscure built-in sound pattern in iMovie and proudly maximized the volume to broadcast his find to the computer lab. Toby crossed the room to see the sound source and promptly incorporated it into his own story (see Figure 4).

Figure 4. Types of Broadcasting in Backyard Transformation activities

Miguel's rebroadcast of his iMovie tune throughout the lab is a type of indirect speech, which Wertsch and Toma (1995) describe as instances in which speakers incorporated text from prior talk. In this example, Miguel was actively interpreting these utterances and the boundary between speaker and listener–and unanticipated future listeners–was not clearly demarcated.

Bakhtin describes the process of appropriation as taking something that belongs to others and making it one's own. "The word in language is half someone else's. It becomes 'one's own' only when the speaker populates it with his intention, with his own accent, when he appropriates the word, adapting it to his own semantic and expressive intention" (Bakhtin, 1986). Appropriation begins to pose a problem when students are encouraged to dissect, transform, or remix artifacts and ideas as part of their individual and collaborative learning processes. What rules define the boundaries between copying an idea versus copying an expressive form? The question of the differences between transformation of a work versus derivation of a work, in terms of copyright, is an important but separate discussion. Bereiter (1994) stated that "classroom discussions may be thought of as part of the larger ongoing discourse, not as preparation for it or as after-the-fact examination of the results of the larger discourse... The important thing is that the local discourses be progressive in the sense that understandings are being generated that are new to the local participants and that the participants recognize as superior to their previous understandings." As prior scholars of Bakhtin have done (e.g., Kozulin, 1996), I extend and generalize Bakhtin's theory of dialogism in

text and language to apply it to multiple modes of communication that are used in the classroom, such as audio, video, verbal, spatial, and gestural. While dialogic theory can be applied across a range of formal and informal learning environments, I focus here on its intersections within computer science and emerging new media. Dialogism provides a framework for understanding computer science and programming environments as a form of collaborative storytelling, in which bits of code are used and reused to fit the goals of the person who is writing the program. In formal educational environments, the dialogic nature of digital media, and how they are used in the classroom, is fluid and can be manipulated by the teacher to encourage collaborative learning environments.

Computing Culture: Collaborative or Individual?

Researchers in computer science education have long questioned the role of collaboration in assignments, looking to understand at what point collaboration ends and plagiarism or cheating begins (Stewart-Gardiner et al., 2001; Sheard, 2002; Harris, 1994; Roberts, 2002). When should teachers encourage students to collaborate? Should the students discuss the ownership of that code? If ownership is not properly acknowledged or attributed, are they cheating? Where does the line fall between collaboration and cheating? Rick and Guzdial (2006) found that faculty attitudes and models of collaboration presented a cultural barrier to collaboration: "If the culture of the context is not compatible, the medium will not succeed." One Civil Engineering faculty member who assigned only individual work stated "But engineering students should have only single-answer problems!" further declaring that he didn't believe that collaboration was important. Such faculty attitudes were commonly expressed among professors in Science, Engineering, and Math related fields, explaining why some students in these classes were fearful that group discussions would be equated with cheating "What was I supposed to do... Those who answered questions were severely criticized by [the teacher]" (Rick & Guzdial, 2006). Related studies in collaborative learning indicate that the perception of single-answer assignments hinders collaboration, instead suggesting that open-ended, ill-structured problems tend to encourage productive group learning. If the students perceive that there is only one answer, they do not see a need for working collaboratively (Cohen, 1994). Because they were accustomed to computer science syllabi that were based on individual coding assignments, computer science students actively resisted collaborating, even though they were encouraged to do so.

In contrast, students in an architecture design class, who frequently engaged in formal and informal dialogues during their group activities, actively adopted the collaborative opportunities that they were offered. Courses where the collaboration was the most successful were focused on dialogue rather than rote learning. "It was more just the ideas bouncing off each other. I don't think this class would have been as much fun if I wasn't able to collaborate." Similarly, "It's not just about the class... People talk about anything, it's a little bit more friendly than just 'here's your assignment'" (Rick & Guzdial, 2006). The technical affordances offered in their online medium were successfully interwoven with the social and interactive learning environments within that disciplinary culture. The framework of dialogism helps to guide the importance of considering *how* the medium is implemented based on its constraints and affordances. The physical properties of the medium influenced the extent to which students perceive it to encourage creativity and collaboration. The dialogism of the medium is not embedded in the medium itself but instead emerges through the specific ways in which the medium is implemented and used within the learning environment. I found that the technical affordances of the medium deeply influenced the ways in which the students felt they could become more creatively engaged with the tool. They were particularly excited when they could transfer ideas between multiple mediums, especially when their creative inspirations were transferred from physical expressions to digital formats (see Figure 5).

Figure 5: Exploring creative mediums.

Many new software environments have been designed to foster collaborative learning of computer science principles. These tools have carefully constructed technical affordances for constructing arguments using drag and drop style tangible interfaces. Traditional computing processes, such as that of a software development life cycle, clearly define the goals, roles, and individual contributions within the collaborative product development process. Tools like CVS[4] are designed to support these processes by identifying each person's individual contribution in terms of code written, time of contribution, and implicitly, the value to the final outcome of the product. In today's culture of remixing, reusing, and sharing online, the traditional notions of computing are being redefined. New models are emerging that no longer delineate individual roles and contributions in the collaborative development process. In MySpace, for example, youth can customize their pages by copying selected sections of HTML from existing MySpace accounts and appropriating them for their own use. There are few rules – either explicit or implicit – for restricting the copy and reuse of another's MySpace page.

A more formal example is Scratch[5] (see Figure 3), a programming language that makes it easy to create stories, animations, games, music, and art while learning about the process of design and computational thinking. Studies show that kids made connections to computer science using Scratch (Peppler & Kafai, 2006).
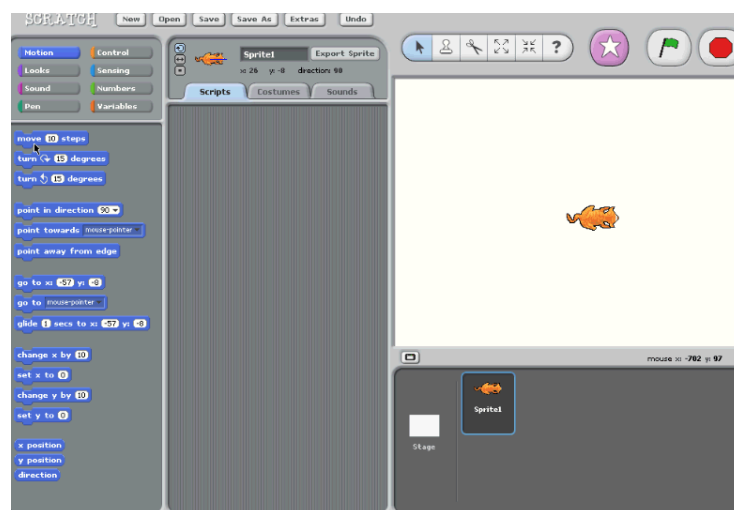

Figure 6. Scratch Drag and Drop Programming Interface[6]

Scratch is different than many traditional programming environments because it explicitly encourages reuse and remixing of media. "[Students] were able to repurpose code in a meaningful way and accomplish artistic design goals for the piece by taking pieces of code and creatively recombining them for new characters" (Peppler & Kafai, 2006). Scratch is inspired the hip hop remixing culture where multiple sounds are generated on a vinyl record player. Using Scratch, kids can mix different types of media, such as graphics, photos, and music, to create new digital stories. Mitchell Resnick states that "we want people to start from existing materials - grabbing an image, grabbing some sound, maybe even bits of someone else's program and then extending them and mixing them to make them their own." A student can visit the Scratch gallery and download specific projects they like and reuse characters, images, or ideas in their own story. Furthermore, Scratch users can then share their creations in a public user gallery, similar to YouTube or Flickr. They can also embed their creations in other social networking sites, such as MySpace or Facebook. Thus, the model for sharing, reusing, and copying becomes explicitly encouraged. The social nature of the medium suggests that collaboration is not only accepted, but is encouraged. Users who upload their projects to the Scratch gallery are choosing to make their projects publicly available and culture of reuse is therefore built into the nature of the medium. The technical affordances of the site convey to the user that their projects will be used by others. A specific "Share" link communicates to the user that the project is being made

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[4] http://www.nongnu.org/cvs/

[5] http://scratch.mit.edu/

[6] http://scratch.mit.edu/

public to the world and a "Download this project screen" indicates that anyone can download a project that is publicly available. (see Figure 7).

Figure 7. Scratch Sharing features

In these environments, authorship becomes a dialogue between multiple voices, in which specific utterances may manifest themselves as text, images, graphics, sounds, and ideas. Collaboration – even when users are not physically collocated becomes built into the system itself.

From Individual Authorship to Multivocality

I propose that through the lens of dialogism, educators can construct collaborative learning experiences both in formal and informal environments by designing around these factors. Kids and teenagers are passionately engaged in their computing cultures and express an interest in learning more about these environments. Our participants expressed an inclination for taking existing media and repurposing it for their own uses. For example, Iris said "I think it's easier because you already have clips. So it makes it more fun because you already have some clips you can watch. And then put another thing together with it. If you had a picture of a birthday party with a war scene then it's kind of cool because you can put them together in different ways. As you think of it." In one session, Iris drew from her existing knowledge of online environments but used paper and pen during her initial idea generation process to flesh out her "mini iMac" commercial. Her plot evolved from ideas about a girl bringing a pocket-sized computer to a birthday party, to the girl being sucked into her computer, and finally discovering something about it:

IRIS: Here's what I have so far: [*holding up paper with first drawings*] She's sitting at home bored when suddenly she sees her mom, OH! [*puts down the paper and begins drawing*]
IRIS: We need some kind of adventure, maybe she gets sucked into the computer? When she's in the computer, she goes to… [*writes: Ida is amazed she can go anywhere she wants*]
IRIS: She goes to…Google! [draws Google and a search box] What should she type in? … OH! [writes "mini iMac" in the search box and then draws a search button

In this sense, the dialog is carried on as a continuous dialogue between other artifacts, authors, and audiences. The dialogue does not merely extend other works, but is iteratively informing and being informed by these works. The dialogue moves bi-directionally, shaping and evolving over time. In follow-up interviews with junior high and high school aged teenagers I found that they were creative, passionate, and enthusiastically engaged in their online digital media environments. They are actively creating blogs and web pages, posting stories and videos online, and remixing art, images, and digital media. When I asked them "If you could learn something new on the computer, what would it be?" they responded "probably like Garage-Band. I think it's cool how you can make music" and "editing videos and stuff" and "iTunes and Photobooth are really cool." Our results suggest that there is an opportunity to establish guidelines for collaborative uses of technology among teenagers by bridging the gap between their perceptions of individual and group roles in their uses of new media. Furthermore, the number of tools and software environments that support collaborative remixing on the web is growing rapidly (Wong and Hong, 2007). These environments are becoming easier to use and are more widely accessible to youth, regardless of their technical abilities. Although early web tools, such as mashups and APIs, required programming expertise in areas such as web crawling, text parsing, pattern matching, and databases (Wong and Hong, 2007), the recent release of intuitive, drag-and-drop tools like Scratch, Yahoo! Pipes[7], or Microsoft Popfly[8] have eased web development into

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[7] http://pipes.yahoo.com/pipes/
[8] http://www.popfly.ms/

the realm of non-programmers. The decreasing need for technical skills in these environments offers a wide range of entry points for youth to merge their activities in their formal and informal environments.

Designing the Collaborative Classroom

Although the contexts of use of the environments I have discussed, from storytelling to computer science programming software, differ significantly, there are common threads across them as dialogic mediums. In a software coding environment that is consistently perceived to be a dialogic genre, the technical affordances that are core properties of that genre can convey to the student how it should be used. Embedded features such as "publish my code to the class" or "download module from group" can help the students to perceive their actions using these features as collaborative, rather than cheating. Similarly, in multimedia environments, features such as "share this picture with the class" or "download character from group repository" can help the students to perceive their actions as encouraged creative reuse. The genre might provide the option for students to associate their name to a section of code–their "utterance"–in order to maintain a sense of individual ownership within the group's final artifact. If the authorship option is disabled, students will be made aware that their code contribution will be incorporated into a group-owned artifact that may not acknowledge individual ownership. In each of these examples, if the teacher can control these types of features by enabling or disabling options during certain phases of students' projects, the students will be more clearly cued into the extent of the dialogic, and accordingly, the collaborative, nature of their activities.

My goal in this chapter is to suggest the potential for designing collaborative classrooms through the lens of this dialogic framework while also exploring open questions about its applications in emerging learning environments. I propose that through the lens of dialogism, educators can construct collaborative learning environments by designing around these three factors. In order to facilitate similar perceptions in the classroom, teachers thus need to explicitly specify rules and clarify expectations to avoid potential misunderstandings. Many incidents of cheating in computer science courses have been due to the differences in awareness and expectations between students and teachers. If students perceive a clearly defined culture of dialogism, they will be better prepared to determine when collaboration is or is not encouraged. The communicative, many-to-many properties of new media suggest that instances of multivocality in the classroom may become more ubiquitous, playing themselves out in novel and unpredictable ways. As researchers and educators, we need to support students in developing literacy skills and critical thinking skills to reflect on the emerging role that technology plays in their formal and informal every day lives.

Acknowledgements

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