OurComixGrid: Designing a Multimodal New Media Learning Environment

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Abstract

This paper describes the theoretical underpinnings of a multimodal Web 2.0 collaborative semantic grid e-learning design environment called OurComixGrid (OCG). OCG combines new media creation and online social networking with cyberinfrastructure to facilitate multimodal literacy education. New media literacies are a necessity in our multimodal world, in which many types of information work together to form meaning. The medium of comics, or sequential art, is itself multimodal, a synergy that makes it an ideal multimodal literacy teaching tool. OCG integrates the multimodal language of comics with grid computing, bringing popular art to a virtual collaborative space for four overlapping communities: students, primary and secondary educators, art practitioners, and academic researchers. The design of OCG also makes use of a self-organizing neural network application to facilitate qualitative and quantitative study of online collaborative practices. Thus, OCG proposes to maximize the potential for these communities to co-create art, pedagogy and curriculum.

Keywords

multimodality, new media literacy, comics, sequential art, social networking

OurComixGrid (OCG) is a Web 2.0 application that proposes the combination of sequential art production, curriculum building and social networking. OurComixGrid (OCG) is a collaborative online virtual art studio and classroom that seeks to use the idiom and methodology of sequential art married to the distributed technology of the semantic grid to facilitate internationally distributed artistic education and collaboration using open source technologies. OCG is a multimodal Web 2.0 collaborative semantic grid e-learning environment predicated on creation and expression through the medium of comics.

What is comics?

"Sequential art" or the word "comics" employed as a singular noun are categorical terms used somewhat interchangeably (see, e.g. Eisner, 1985, McCloud, 1993, McCloud, 2000), to describe the medium of expression found in comic books, comic strips, graphic novels, manga (Japanese comics), webcomics (online comics), and other formats. The medium is defined by the integration of text and image and the combination of multiple images in narrative sequence. As a medium, it has as vast a potential for expression and communication as text or image alone. As a form of popular culture, its popular appeal is growing.

The medium of sequential art has been mistaken for a genre limited to science fiction, action, or humour stories directed solely to a young audience often in the West, particularly in the United States. Recently however, comics has begun to receive more widespread recognition as a unique and heterogeneous form of expression, as evidenced by the exponential growth of comic books, manga and graphic novels of a variety of styles and genres in bookstores, libraries and mainstream press reviews. This trend is readily observable in the rapidly growing American graphic novel movement, for example, which has produced everything from biographies (e.g. 1992 Pulitzer Prize winner *Maus* by Art Spiegelman, *Louis Riel* by

Chester Brown) to historical fiction (e.g. *Stagger Lee* by Derek McCulloch and Shepherd Hendrix) to science fiction (e.g. *Transmetropolitan* by Warren Ellis and Darick Robertson) to visual informatics (e.g. *The 9/11 Commission Report: A Graphic Adaptation* by Sid Jacobson and Ernie Colon). The growth in widespread perception of comics as a legitimate form of creative expression has brought with it a resurgence of the concept that sequential art can serve as a potent teaching tool.

Comics and multimodality

In enumerating the strengths of comics in education, Yang (2003) writes that students are motivated to read comics, comics appeal to visual learners, and the visuals are permanent rather than time based (like television) so students can read at their own pace. According to Yang, these strengths "can be harnessed in practically any subject and at practically any grade level" (Conclusion, online). Indeed, librarians and educators alike assert that comics help raise literacy rates. But, as Jacobs (2007) states, this approach to comics as a "debased or simplified word-based literacy" ignores the "complex multimodal literacy" required of and taught by reading comics (p. 21).

Comics is definitionally multimodal given that it intertwines multiple complex forms of visual and textual information to create the meaning. For example, when placed in a caption box, text in a comic can operate as a narrative voice, as it does in literature, but used in conjunction with the symbol of speech balloons, text can function as simulated sound. Further, different types of speech balloons connote different types of speech. A round balloon drawn with a solid line indicates regular speech, while a balloon drawn with a jagged line indicates yelling, and a balloon drawn with a dotted line symbolizes whispering. And this is just scratching the surface. Text and image in comics form a complex "network of visual and semantic correspondences" (Kuhlman, 2007, p. 855).

According to Jacobs (2007), it is through the coexistence of these multiple modes of meaning on the page that comics engender an "active process" of reading and writing which can "prepare students for better negotiating their worlds of meaning" (p. 25). Norton (2003) writes of increased sense of ownership of texts by children when reading comics, because of a connection to their own worlds. sequential art is a medium well-suited to engaging students in the participatory processes of meaning making Jenkins (2006) and Cope & Kalantzis (this symposium) describe as essential for effective use of new media in education.

Authors like Kress (2000) and Jenkins, Clinton, Purushotma, Robinson, & Weigel (2006) have asserted the importance of new and multiple literacies in a world where meaning is multimodal, derived from a combination of visual, textual, and aural information. Jenkins (2006) also demonstrates that in this age of digital media users participate in the creation of media, using storytelling as a means of sharing, creating structures to make sense of our common experiences.

Kress (2000) chooses to go beyond linguistic theory to create a new definition of "literacy" in a world that extends beyond the printed page. He embraces social semiotics as a way of meaning-making. As he exemplifies, we are now in a world were the page is the screen and image is the language of the generation who is steeped in the digital age. This young audience is adept at reading multimodal texts. These new media forms (e.g., handhelds, ipods, cell phones and computers) give rise to the redefinition of text and literacy in the digital age. As Kress puts it, the technology "demands that we engage with the young on the grounds of their experience…" (p. 175). Since computer mediated education allows both instructors and students to create knowledge through multiple media (Hawisher & Selfe, 2007), the multimodal language of comics also has synergies with online education. OCG proposes to marry the already synergistic multimodal natures of comics and new media technology with semantic grid technology in order to meet the demands Kress describes.

Comics in online education

McCloud (2003) asserts that taking comics from the printed page to the computer screen presents the medium with an "infinite canvas" on which to reinvent itself (p. 222). However, despite the many possibilities for interactivity and art creation in this burgeoning new format for sequential art,

comparatively little work has been done making use of the medium in a digital environment for educational purposes.

Online educational comics fall into four groups. First, there are sites that offer some sort of technical comics education, what McCloud (2003) describes as "the study of comics with an eye toward creating them" (p. 92). Second, there are sites that offer bibliographic and review information for teachers. These tend to overlap in terms of content with the third group, websites that promote and facilitate the inclusion of print comics in primary, secondary, and higher education curriculum. The fourth group is less common: internet resources that move away from text based presentations and use sequential art to teach.

Of these groups, technical arts education and curriculum sharing sites make use of social networking to form communities of sequential arts practice. For example, Digital Webbing (http: http://digitalwebbing.com/) hosts a "Creator Community" virtual message board, on which comics creators at various stages of proficiency can post art for criticism, ask questions of more experienced members, or post tutorials and tips for less experienced members. The website of the National Association of Comic Art Educators (http://teachingcomics.org) offers a similar message board for online discussion between comics art educators, as well as a database of lesson plans using print comics as classroom resources. These two communities can interact with each other and with students through ubiquitous comics related social networks such as Comicspace (http://comicspace.com), which functions as a specialized Myspace for comics creators and fans combining blog, image gallery, and a comments section. However, there is no dedicated virtual space such as OCG that encourages these groups to come together and collaborate in order to further the multimodal educational potentials of the comics medium.

There are two online comics in particular that gesture towards the educational potentials of comics in an interactive online environment. *Factoring with Mr. Yang* (Yang 2003) is a webcomic that uses navigation created through Macromedia Flash. It features two parallel narrative threads in the form of two horizontal rows of comics panels. The top row features a cartoon Gene Yang standing in front of a chalk board. Mr. Yang lectures on factoring in algebra, with examples drawn on the chalkboard in each panel. The bottom row features a purple alien character named Mosley the Alien that stands in for the student. Mosley is always visible in a panel on the left of the screen, pointing to the left, saying, "Can we review a bit?" and in a panel on the right of the screen, pointing right and saying, "Let's keep going!" These panels double as navigational buttons that move Mr. Yang's lecture forwards and backwards. At some instances during the lecture portrayed in the top thread, a third Mosley panel appears in the middle of the other two in which Mosley asks for clarification or more examples of what Mr. Yang is describing. Should the reader share Mosley's need for extra help, he or she can click on this middle panel, causing more panels to be inserted in the top thread. In these panels, Mr. Yang provides more in depth explanation of the factoring problem under discussion (Yang 2003). The result is a webcomic that makes unique use of the technology of the internet to incorporate a degree of interactivity and teacher presence into its educational content.

Electric Spirit (Watkins 2002) is another webcomic that adds an element of interactivity to its educational content using Macromedia Flash. Described on its home page as "the web's only Japanese instructional interactive manga", Electric Spirit is a ghost story in the style of a Japanese comic that allows the reader to toggle the dialog balloons between English and Japanese. The interface allows the reader to change all of the text to one language or another, or alter a single word balloon by rolling over it with the mouse. Rolling over also brings up another balloon containing conversational and linguistic context for the dialog, and a side menu opens lists of study goals. Clicking on particular kanji in the manga brings up "a description of the character with notes regarding strokes, readings, and tips for remembering them" (Watkins 2002).

Both *Factoring* and *Electric Spirit* are several years old, but they clearly indicate undercapitalized possibilities for incorporating comics in e-learning. OurComixGrid represents an attempt to pick up where these works leave off, an application combining software for sequential art creation with distributed ICT and e-learning models for synchronous and asynchronous communication into a collaboratory where artists can work with each other and in tandem with academic theorists, educators and students to create innovative multimodal educational projects.

OCG technology

OCG is unique in its combination of the cyberinfrastructure of the semantic grid with Web 2.0 interface and social networking technology in order to create a virtual environment to enable collaborative art production and curriculum creation. OCG is also unique in that it integrates CATPAC, a self-organizing neural network into its system for the purposes of researching the creative processes that are fostered by the social dynamics of the OCG system. "The analysis is initiated passing a window of *n* consecutive words (text) through a "scanning window". CATPAC's resulting matrix resembles a typical covariance or correlation matrix and can be used as input matrix for multivariate statistical analysis" (Schmidt, M. Online). Because comic artists create a script of their work, CATPAC will "read" this script to enable OCG researchers to use the resulting data for an array of different analyses of textual material, including the generating of textual descriptions based on the script or storyboard of the comic. These CATPAC "tags" will be used to augment textual descriptions created by the artist and facilitate meta-level analysis of the artistic educational collaborations taking place within this semantic grid environment.

In order to create a worldwide virtual organization of OCG users that have the ability to create, manipulate and move large datasets of visual art seamlessly it is necessary to utilize the distributed nature and power of cyberinfrastructure. Cyberinfrastructure is a term first coined by the United States National Science Foundation. It uses the metaphor of the physical infrastructure of modern societies – bridges, roads and electrical grids. Therefore, cyberinfrastructure refers to the infrastructure that is based upon distributed computing and information, communication technology and data. "… cyberinfrastructure is required for a knowledge economy" (Atkins, D. et. al, 2003).

Grid computing is the connector, the part of the infrastructure that links the various systems that comprise cyberinfrastructure. To grossly oversimplify, grids are the "roads" of the cyberinfrastructure environment. The semantic grid is an extension of the grid. However, "information and services are given well-defined meaning, better enabling computers and people to work in cooperation. It directly enables the next generation Grid infrastructure as well as the use of higher-level knowledge in Grid applications, a layer characterized as the Knowledge Grid" (Gobal and DeRoure, 2004, p.1).

Because OCG will deal with distributed large-scale data over long periods of time, the policies used to manage the data and provide assurances about the authenticity of the data become paramount. The integrated Rule-Oriented Data System (iRODS) (http://irods.sdsc.edu) provides the mechanisms to describe management policies, as well as providing the ability to track how the policies are applied and their execution results. The iRODS data grid maps management policies to rules that control the execution of the remote micro-services.

> As an example, a rule can be created that automatically creates a replica whenever a file is added to a specific collection, or extracts its metadata automatically and registers it in a searchable catalogue. For the replication operation, the persistent state information consists of the replica location, the creation date, the owner, the replica size, etc. The mechanism used by iRODS for providing policy virtualization is based on well-defined functions, called micro-services, which are chained into alternative workflows using rules. A rule engine, based on the event-condition-action paradigm executes the rule-based workflows after an event. Rules can be deferred to a pre-determined time or executed on a periodic basis. As the data management policies evolve, the iRODS system can implement new rules, new micro-services, and new state information (metadata content) needed to manage the new policies. Each sub- collection can be managed using a different set of policies. (Rajasekar, A. et. al., 2003, p.1)

Features for artists, students, and educators

OCG will function as a standardized and accessible database of art open to quantitative as well as qualitative study by any stakeholder. For example, this transparency of collaboration within and between artistic and educational communities of practice can provide new opportunities for social networking analysis. This gives OCG the ability to provide artists and students with software for comics creation. It

will also provide version tracking software which will keep track of different versions of a work in progress developed during the collaborative process for a more efficient workflow between collaborators. Synchronous and asynchronous communication modules will allow for interaction between collaborators. The large visual files created in such collaborations will be sent more easily using the semantic grid computing of cyberinfrastructure. Artists and students will be able to easily display their work online, work with others in the creation of art, and have their work accessible through a standardized database. Artists will be provided with a potential audience in the students and potential collaborators in educators seeking to create engaging multimodal curriculum.

In addition to functioning as a virtual art studio, the communication and organizational features of OCG will also function as a virtual classroom. Teachers will be able to use the synchronous and asynchronous communication modules to interact with students. Teachers can assign group projects to students, the progress on which can be tracked through the application's version tracking functions. Teachers can bring artists working on OCG in as virtual guest lecturers, or can work in tandem with other teachers and artists to develop curriculum. Teachers can use the social networking feature to share curriculum not only with their own community of practice, but also with the other interrelated communities of practice for which OCG will be created.

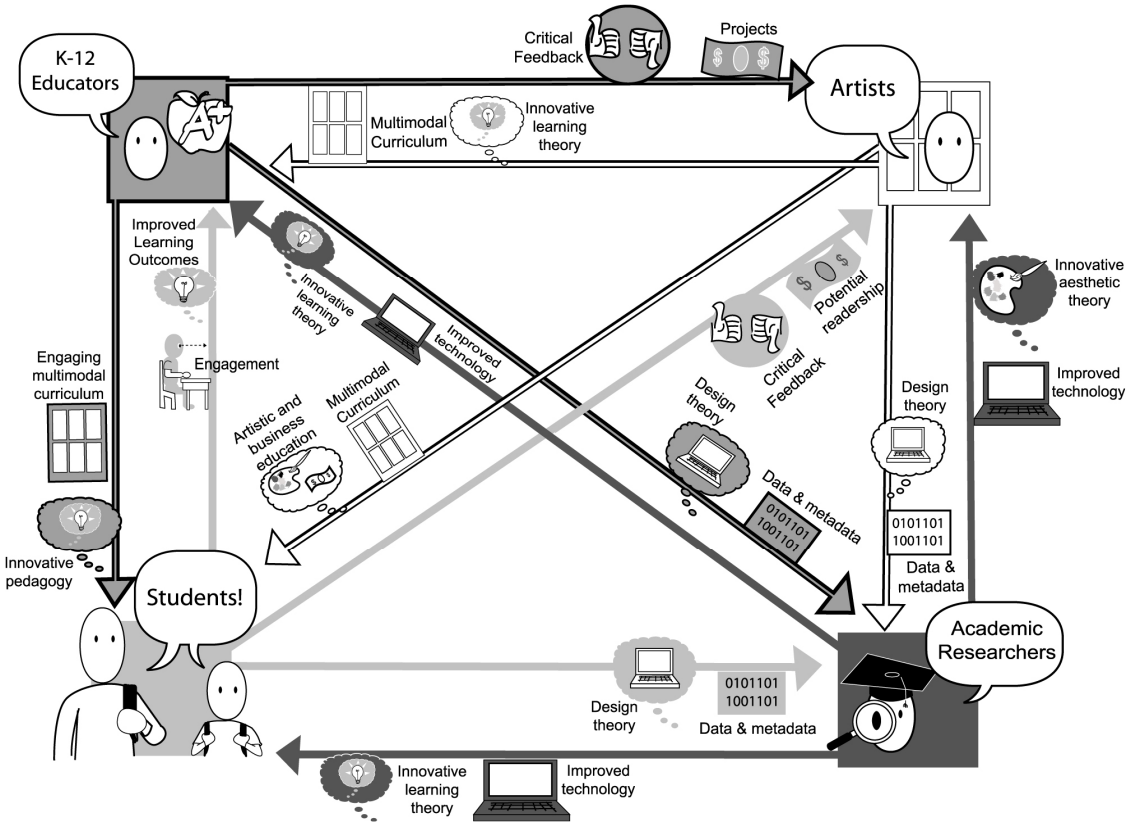

Figure 1: Reciprocal affordances of collaboration through OCG for each user community

As illustrated in Figure 1, the affordances provided by the features of OCG are designed to provide reciprocal affordances for each of the project's four target user communities to encourage their use of and collaboration through the application.

Conclusion

It has been suggested that the multimodal meanings created by comics have the potential to teach critical multimodal literacy skills (see, e.g. Norton, 2003, Gardner, 2006, Jacobs, 2007). However, little work has been done on how these potentials might be fulfilled. OCG seeks to make such work possible. As a collaborative social networking tool powered by the semantic grid and iRODS, and as a facilitated research enabling tool using CATPAC, OCG proposes to provide an environment that will lend itself readily to the participatory nature of new media technology. In addition, OCG offers a myriad of research

opportunities. For example, the affordances of sequential art and OCG technology, the participatory culture that will result as audiences engage in the social networking aspects of OCG, and the multimodal texts created through collaboration on OCG are just a few potential areas of inquiry.

OCG also has the capacity to bring together students and artists whose natural abilities fall into several domains – literacy, artistic expression, logic, and problem solving. The OCG environment allows enactment and involvement of all of these different aspects of learning and production. OurComixGrid provides an ideal virtual research environment for the impact of the exploration of multimodal meaning through the combination of artistic expression and collaborative practice.

OCG will provide, in particular, students the ability to work together in a collaborative and/or coordinated effort that provides training in contemporary ways of working which lead to experimentation and discovery. The combination of artistic expression with technology allows a greater range of modalities of talent to be brought to the fore, potentially helping students not only discover their best domain of production, but also providing them with means of learning how to combine that with the work of others. As technologies increasingly become part of the process of knowledge production, learning to work in conjunction with others in distributed or co-located teams through technology provides skills in collaborative activity that match contemporary trends in work relationships.

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Authors Note

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