World Wide Workshop Foundation

INNOVATION REPORT #3

AUGUST 2008

DRAFT

THE GLOBALORIA PROGRAM

AT RANDOLPH TECHNICAL CENTER (RTC)

ELKINS, WEST VIRGINIA

PRELIMINARY RESULTS FROM PILOT-YEAR-1
THE GLOBALORIA PROGRAM

AT RANDOLPH TECHNICAL CENTER (RTC)

ELKINS, WEST VIRGINIA

PRELIMINARY RESULTS FROM PILOT-YEAR-1

Contents

Acknowledgments .......................................................................................................................................................... i
About the World Wide Workshop ................................................................................................................................. ii
Summary of Findings ................................................................................................................................................... iii
Introduction ................................................................................................................................................................... 1
Globaloria in West Virginia ........................................................................................................................................... 3
Theoretical Model, Research Framework and Variables .............................................................................................. 5
The Pilot Study at the Randolph Technical Center in Elkins, WV .............................................................................. 10
Results ......................................................................................................................................................................... 20
Future Directions ........................................................................................................................................................... 69
Conclusion ................................................................................................................................................................... 71
Appendices .................................................................................................................................................................. 72
End Notes .................................................................................................................................................................... 84

Tables

Table 1. Globaloria Pilot Sites and Integration with School Curriculum ................................................................. 3
Table 2. Globaloria Promoted Development of Six Contemporary Learning Abilities (6 CLAs) ................................. 7
Table 3. Globaloria Team Site Visits, Pilot-Year-1 ..................................................................................................... 17
Table 4. Increases in RTC Students’ Frequency and Motivation for Engaging in Activities .................................. 29
Table 5. Home computer use for engagement in activities representative of the more complex CLAs 1-3 .............. 30
Table 6. RTC Students Intending to Engage in Activities Related to the More Complex CLAs 1-3 ......................... 30
Table 7. Cassie’s Wiki Activity ................................................................................................................................... 39
Table 8. Jacklin’s Wiki Activity ................................................................................................................................. 43
Table 9. Selena’s Wiki Activity .................................................................................................................................. 45
Table 10. Kris’ Wiki Activity ...................................................................................................................................... 56
Table 11. Brandon’s Wiki Activity ............................................................................................................................. 58
Table 12. Toby’s Wiki Activity ................................................................................................................................... 59
Figures
Figure 1. Map of West Virginia showing Globaloria pilot locations.................................................................4
Figure 2. Randolph Technical Center (RTC).....................................................................................................11
Figure 3. Mac Computer Lab at RTC ..............................................................................................................11
Figure 4. Game Design lead educator Denise Stalnaker (right) and co-educator Paula Heinke.......................12
Figure 5. Mrs. Stalnaker’s webgame ..............................................................................................................14
Figure 6. RTC Homepage (screenshot) MyGLife.org/usa/wv/rtc .................................................................14
Figure 7. RTC MyGLife Wiki Homepage (screenshot) How to create Member Profile page .....................15
Figure 8. Globaloria Game Design Topics (screenshot) ..................................................................................15
Figure 9. Globaloria Game Development Topics (screenshot) .....................................................................16
Figure 10. Globaloria Team, RTC Site Visit, September 19, 2007, ................................................................17
Figure 11. Evaluation of Game Design Assignment .....................................................................................18
Figure 12. Evaluation of Game Presentation .................................................................................................19
Figure 13. Computer Ownership ..................................................................................................................20
Figure 14. Home Network Connections ....................................................................................................21
Figure 15. Survey question on students’ frequency of engagement in Six CLAs (screenshot) .....................22
Figure 16. Frequency of Computer Use* .......................................................................................................22
Figure 17. Survey question on students’ motivation towards 6-CLAs (screenshot) ........................................23
Figure 18. Self-Reported Technology Knowledge ..........................................................................................23
Figure 19. Prior Interactive Computer Activity ............................................................................................24
Figure 20. RTC Students’ Frequency of Technology Use, by CLA type, prior to Globaloria .................25
Figure 21. RTC Students’ motivation toward technology use by CLA type, prior to Globaloria .............25
Figure 22. Total monthly Wiki edits by RTC Game Design students ............................................................27
Figure 23. Average monthly Wiki edits per RTC Game Design student .......................................................27
Figure 24. Cassie, Sept. 2007 .........................................................................................................................35
Figure 25. Cassie’s Character .........................................................................................................................36
Figure 26. Cassie’s team game proposal .........................................................................................................37
Figure 27. Cassie’s sample game intro page (not implemented) ..................................................................37
Figure 28. Haunted Schoolhouse Game - Level 50’s (series of screenshots) ..................................................38
Figure 29. Jacklin .........................................................................................................................................43
Figure 30. Jacklin’s early graphic design sample ..........................................................................................43
Figure 31. Selena ..........................................................................................................................................45
Figure 32. Jacklin’s static graphic elements (not implemented) ....................................................................48
Figure 33. Selena’s animated graphic elements (not in final game) .............................................................49
Figure 34. Screen Shoots from Sammy the Salmon .......................................................................................50
Figure 35. Down to Business: The Serial Experimenters .............................................................................55
Figure 36. Kris (standing), with teammate Brandon .....................................................................................57
Figure 37. Brandon (standing), with teammate Kris ....................................................................................57
Figure 38. Toby .............................................................................................................................................58
Figure 39. Serial Experimenters’ game proposal ............................................................................................60
Figure 40. Serial Experimenters’ game design elements .............................................................................60
Figure 41. The Serial Experimenters’ final game design (screenshots) ..........................................................63
Acknowledgments

The implementation and success of Globaloria throughout West Virginia and, in particular, at the Randolph Technical Center (RTC) in Elkins, from July 1, 2007 through June 30, 2008, involved the hard work and contributions of many people.

We are thankful for the funding and support we received from Governor Joe Manchin III of West Virginia and the Governor’s Office, the First Lady Gayle Manchin and her team, the Benedum Foundation and Jim Denova, Verizon West Virginia and B. Keith Fulton. We thank our Globaloria-WV Advisory Board -- First Lady Gayle Manchin, Hon. Gaston Caperton, Tom Haywood, Lloyd Jackson, Jay Cole, Prof. Bobbi Nicholson, Prof. Jaci Webb-Dempsey, and Dr. Doris Redfield. Special thanks to Nancy Sturm from the Office of the Governor who initiated this collaboration in the first place. We thank Dr. Pat Kusimo and her team from the West Virginia Center for Professional Development for being helpful advisors and facilitators of our professional development activities during the first year of GLOBALORIA-WV, and for becoming our partners in the second year.

We are especially grateful for the dedication and insights of the teachers and administrators who adopted Globaloria. Mrs. Denise Stalnaker, our lead educator at RTC, has been one of the most enthusiastic participants from the beginning. She was so helpful to us and a mentor to other teachers. We also thank our West Virginia Project Manager, Dr. Lee Kraus, and the energetic and entrepreneurial team of the World Wide Workshop Foundation, especially our Director of Programs, Shannon Sullivan, Director of Partnerships and Operations, Amber Oliver, Product Manager, Itay Ophir, and Director of Research, Dr. Rebecca Reynolds. Above all, we thank our enthusiastic and dedicated Globaloria pilot group of students.

Idit Harel Caperton
President & Founder
World Wide Workshop
New York, New York
August, 2008
About the World Wide Workshop

The World Wide Workshop Foundation is a §501(c)(3) organization based in New York City. We are a global foundation, committed to developing open-source applications of social media technology and game production, with the mission to enhance learning, innovation, entrepreneurship, and an understanding of the world in economically-disadvantaged and technologically-underserved communities. We work with forward-thinking leaders, governments, corporations, school systems, universities, foundations and research centers worldwide to enrich existing formal and non-formal education with the latest technology and innovative learning opportunities.

Innovation Report #3 was prepared by Dr. Rebecca Reynolds, the World Wide Workshop Foundation Director of Research, and Dr. Idit Harel Caperton, President and Founder. It is part of a series of innovation reports currently in progress. THIS IS A DRAFT: Please email us for permission to copy and cite this draft until we post a final version online at www.WorldWideWorkshop.org.

Web 2.0 research methodology and wiki-based technology, which we call Research 2.0, makes our resources available online in an open wiki-based research lab. At this time, we have begun work on the expanded second year of Globaloria in West Virginia. Many of the lessons learned and recommendations have already been implemented.

The Globaloria West Virginia pilot is learning-by-doing, and therefore, thoughts and feedback of our report readers are important to us. Throughout the second year, real-time reports, databases, summary reports, and mini-profiles will become available as we collect the data. For questions, information, and feedback, contact: Idit@WorldWideWorkshop.org.

CALL FOR PARTNERS: We invite interested researchers and scholars, bloggers and documentary film-makers, to join us in our efforts. We welcome your ideas and proposals to further our efforts by conducting your own research in collaboration with the Globaloria team.
Summary of Findings

In the first pilot year, during July 2007 – June 2008, Globaloria was implemented successfully in seven locations throughout the state of West Virginia (18 educators and 89 students participated). This report is the story of one location. It presents our findings from the Randolph Technical Center (RTC) in Elkins. We reveal for the first time composite student data, observations culled from transcribed teacher interviews, field notes and videos. Most meaningful are case studies of six students representing a cross-section of the Globaloria class. As we continue to grow the program throughout the state (currently in 14 schools, 250 students and 30 educators), we also continue to synthesize our first-year findings. We are pleased to state several initial conclusions:

Implementation was successful. The Globaloria platform and curriculum were well-received by teachers and students. The success of Globaloria caused RTC teachers and administrators to contemplate the introduction of a high school major in digital game design. Beginning in September 2007 twenty RTC students participated in an experiment in Web 2.0 collaborative learning. They used the Globaloria Wiki Starter Kit, the MySQLife.org learning platform and hands-on help to complete individual and team assignments as they progressed in the game design process. They created profile, project and team pages and commented on each other’s work. They particularly appreciated live expert resources. Working in teams of two or three students, by the end of the semester, in January 2008, class teams had created eight games, proudly posted on the RTC Wiki.

RTC infrastructure was functional and compatible with Globaloria. The RTC computer lab and technology equipment were highly reliable and there were few technical interruptions.

Daily integration of the program contributed to its success. RTC students had ninety minute sessions each school day and received course credit and a grade. With more regularly scheduled class time than students at other pilot locations, where game design was offered just twice a week and as a more informal after-school program, RTC students excelled.

Strong participation and enthusiasm of the lead educator contributed to the program’s success. Mrs. Stalnaker was a highly active participant, communicating frequently with the WWW Foundation team, and contributing her own creative and innovative solutions, such as an original evaluation system. She learned Flash, ActionScript and wiki programming along with her students, and participated in all opportunities for professional development.

Through participation in Globaloria, students acquired new skills and gained insight into the collaborative ways of working and learning made possible by Web 2.0 technology. We identified a set of 6 contemporary learning abilities (CLAs), developed our curriculum to support the CLAs and used the CLAs, in part, to measure the success of our program. We found statistically significant increases in the frequency of students’ engagement in certain CLA activities, specifically online team collaboration, creating with digital media and surfing for information as well as increased enjoyment, confidence, motivation and knowledge. As our research progresses we will refine the CLAs to reflect our findings.

Globaloria appears particularly well-suited to individualistic learning styles associated with this generation of Internet-connected teens and students identified as learning disabled. Our project highlighted the need for new methods of teaching and support for students with alternative approaches to schoolwork that impede their achievement in the traditional school
setting. It is important for the World Wide Workshop team to provide educators with unconventional evaluation tools that will accurately reflect student effort and performance.

Two of our case study students overcame the limitations of dyslexia in the Globaloria creative atmosphere. One took on the role of class computer programming expert and went on to higher education in math. Another assumed the role of project manager, produced the background music for his team’s game and became interested in the game design industry.

**Game design creates unique opportunities for students to explore talents and interests.** Globaloria immerses young people in an environment of original thinking to enhance their entry into the real world of virtual project-based work. For example, case study students developed as project managers, leaders and team members, learned to access resources for self-teaching and information about community and environmental topics, and discovered new career possibilities.

**Year 1 data provides a critical reference point.** Semester 1 feedback resulted in adjustments in the Semester 2 curriculum and platform. We implemented several new supports, including live web sessions with expert Flash designers, and improved the MyGLife.org platform. We will continue to refine the Starter Kit, expand tutorial resources, especially Flash programming videos, use wiki data to develop strategies to increase wiki use and interaction in the online learning platform and use other data to guide syllabus changes, such as sequencing of activities and assignments. Efforts are being made to enable students to continue Globaloria activities on their own time. These strategies include availability of open computer lab time during and after school, maintenance of the Semester 1 Wiki website and blog for lab and home access, ability to maintain online and in-person collaboration with the continuing students and developing internship possibilities for students to stay connected and mentor new students.

**We need to learn more about the relation between grades and motivation.** Students who had earned high marks in traditional settings may have been motivated to exert effort when assignments were graded. However, grades may not motivate students who are more independent learners. Evaluation of student performance and effectiveness of graded assignments are areas for additional research.

**We plan to track our case study students to learn how Globaloria has affected their lives.** We will collect and use this data to address the complex learning modalities required to meet contemporary social and economic challenges.

We believe that through engagement with Web 2.0 technology in a collaborative setting to design and produce games, students experience leadership, democracy and globalization. Once having learned basic skills they can build and share their knowledge and philosophy with others, not only on the MyGLife website (http://myglife.org) but in school, state and international networks for education, socialization and business.
Introduction

Interactive modes of digital communication — the New Internet or Web 2.0 — have become dominant forms of expression. These new technologies — and the creative ways they are used by millions of people in governments, universities, and companies worldwide — are profoundly changing how we live and work.

At the World Wide Workshop Foundation, we believe the New Internet has significant potential for education and economic development, but its potential can only be tapped by those who are digitally literate. Therefore, we propose educational opportunities that enable economically disadvantaged young people, as well as their more fortunate peers, to use advanced technology and become active participants in the fast-paced global economy. We developed the GLOBALORIA collaborative game design curriculum to prepare students to enter the real world of multi-media, multi-lateral interaction in social, business and public spheres.

Digital Literacy. Today, the ability to create digital media and stories is to digital literacy what creative writing is to traditional literacy. Creating narratives and interactive media with digital technology has become a new basic skill. As interactive digital modes of communication gain dominance as forms of expression, not knowing how to produce digital content – in linear and non-linear, static and dynamic formats – is equivalent to an inability to write.

Traditional knowledge of the written and spoken language and traditional forms of creative expression are still important, but young students must also acquire the full range of Web 2.0 technology. Just as we teach critical reading and writing, we must also teach young learners to read and construct their own interactive digital media systems – textual and graphical media, photography and video media, animation and game media. Blogs, wikis and social network platforms, utilized in this new educational paradigm, encourage young people to imagine, create, process, and share ideas and expertise as they learn digital design, create artifacts and tell stories.

World Wide Workshop Foundation and Globaloria. The World Wide Workshop Foundation is the first organization to create a program that helps students achieve proficiency in the new writing by means of social and collaborative game construction, using open source Web 2.0 platforms. Young learners transition from isolated forms of individual expression towards a rich project-based workshop experience.

Here’s how the meta-game of Globaloria works: Globaloria is the platform. On it are based multiple social networks across which students learn to build games in a collaborative virtual community. An individual class or after-school group can form its own small community within a network, and can connect with other communities in that network.

Each community receives a starter-kit website with four learning channels, filled with learning resources, such as sample games with downloadable code and custom tutorials, enabling students to design and develop a game. The community also receives a wiki that serves as a virtual classroom or clubhouse. The young learners create profile and project pages on the wiki. Each member creates a blog for sharing his or her game-making experience and learning accomplishments with others in the community.

Each network focuses on a theme, such as health, science, math, human rights, or global issues. The game the students build is created around that theme. Final games are published on the Web.
Through this immersive process of digital design and creation, young learners master the new fundamental abilities to originate digital content, to write and read digitally, to express themselves in a networked community, to innovate and collaborate using social networks and social media technology — the very skills needed to be productive, successful 21st-century citizens. By bringing cutting-edge technologies and an innovative learning formula to young people in economically and technologically underserved communities, Globaloria helps close the digital opportunity gaps that exist in the U.S. and worldwide.

We are currently working on several educational initiatives. One of our most substantial is the state-wide West Virginia project, which takes Globaloria to a new level.

**Pilot Year 1 at RTC** From September 2007 through January 2008 at the Randolph Technical Center (RTC) in Elkins, West Virginia, a class of 20 high school students, grades 10 through 12, with different levels of digital competence and approaches to learning, all novices in the invention and completion of an educational web-game, used the MyGLife.org suite of resources and teamwork to design and create interactive games. The class met for 90 minutes each school day. Students completed individual and team assignments emphasizing collaboration through online tutorials, wikis and blogs.

This report presents composite data, including 3 surveys, observations culled from transcribed interviews with educators, field notes, videos and site visits, and case studies of six students representing a cross-section of the class. To varying degrees the data indicates affective, behavioral and cognitive changes consistent with our Globaloria objectives. Of particular interest is the personal development we observed in case study students, including project management, leadership, resourcefulness, self-teaching, teamwork, career-orientation, awareness of local cultural issues and adoption of open source norms.

Like Wikipedia, Google, and other recent examples [of the New Internet], GLOBALORIA has the potential to connect people and computers so that, collectively, they act more intelligently than any people, groups, or computers have done before.

Professor Thomas Malone
Massachusetts Institute of Technology
Author: Future of Work
Globaloria in West Virginia

A Private-Public Partnership. The World Wide Workshop Foundation initiated the Globaloria pilot program in partnership with the West Virginia Office of the Governor and the Benedum Foundation. In the fall 2007 school semester we launched Globaloria at urban and rural locations in six counties throughout the state. See Figure 1, Map of West Virginia showing Globaloria Pilot Locations. A first-of-its-kind social network for learning was born.

Six schools and one program for at-risk youth were our initial launch locations for Globaloria in WV, Pilot-Year-1. One location (Kasson Middle School) joined mid-year.

Table 1. Globaloria Pilot Sites and Integration with School Curriculum

<table>
<thead>
<tr>
<th>School</th>
<th>Location</th>
<th>Launch Date</th>
<th>Integration with School Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitol High School*</td>
<td>Charleston</td>
<td>1st week in October 2007</td>
<td>after school program</td>
</tr>
<tr>
<td>Clay High School</td>
<td>Clay</td>
<td>1st week in October 2007</td>
<td>after school program in fall, integrated with curriculum in spring semester</td>
</tr>
<tr>
<td>Clay Middle School</td>
<td>Clay</td>
<td>1st week in January 2008</td>
<td>after-school program</td>
</tr>
<tr>
<td>Florence Crittenton Services Enrichment Program for At-Risk Youth</td>
<td>Wheeling</td>
<td>1st week in October 2007</td>
<td>offered as an activity several times per week</td>
</tr>
<tr>
<td>Kasson Middle School</td>
<td>Kasson</td>
<td>1st week in January 2008</td>
<td>integrated with daily curriculum</td>
</tr>
<tr>
<td>Man High School*</td>
<td>Man</td>
<td>1st week in October 2007</td>
<td>after school program</td>
</tr>
<tr>
<td>Marshall Community Technical College</td>
<td>Huntington</td>
<td>1st week in October 2007</td>
<td>Integrated</td>
</tr>
<tr>
<td>Randolph Technical School</td>
<td>Elkins</td>
<td>Sept. 5, 2007</td>
<td>integrated with daily curriculum, fall and spring semesters</td>
</tr>
</tbody>
</table>

*Health Science and Technology Academy

The main entry point into the Globaloria, WV social network and eLearning environment is http://www.MyGlobalLife.org/usa/wv. This page links individual communities in Globaloria’s WV network. As new members join, the network will grow.
Figure 1. Map of West Virginia showing Globaloria pilot locations
Globaloria and the Constructionist Theoretical Model

Idit Harel Caperton Invents and Develops Various Digital Media and Learning Projects Over Three Decades that Lead to Globaloria. In the 1980's, while working at the MIT Media Lab, Idit Harel (now World Wide Workshop Foundation's president Idit Harel Caperton) observed that children’s educational software development, programming, and game design require the development of knowledge and ideas in symbolic form (through programming), and focused her epistemological research on children's creation of computer software and games about mathematical concepts such as fractions. A group of elementary-school students used the Logo programming to represent mathematical concepts such as fractions in complex programming code, visual, and interactive multimedia symbols.

This breakthrough design research on Constructionist learning through programming and digital media production was published in several articles with her mentor, MIT Professor Seymour Papert, and also wrote a book called *Children Designers*, which received the outstanding Book Award from the American Educational Research Association (AERA) in 1992. Idit Harel Caperton was the first to situate 10-year old children in the role of software designers and media producers. It was a courageous and inspiring attempt, as described by Sheldon White, a Professor of Psychology and Department Chair at Harvard University in 1991:

> Some of the limitations of contemporary schools are thrown into relief by Idit Harel’s fascinating study. Too much is in words. Too much is passive. The child isn’t just going to receive culture from us, the adults of the present; the grown-up child will own the society, will repair it, and will strive in diverse ways to make it better. Perhaps if we could truly grasp and hold an image of the child as creator, the kind of image that rises out of this book, there would be a little less despair and crisis-mongering in contemporary discussions of education.

David Perkins, the Co-Director of Harvard Education Technology Center, and Project Zero at the Harvard Graduate School of Education, wrote in 1991:

> In this work, Idit Harel combines a sensitive clinical methodology with formal assessment of results to show how children undertaking design projects rather than studying conventionally, can gain a much deeper conception of subject-matter knowledge, of computer programming, and perhaps even of themselves as thinkers and learners.

A few years later, in the mid 1990's Dr. Harel Caperton took her vision to the Internet and launched MaMaMedia.com, a pioneering, dynamic, award-winning website for children, which in the First Internet Era pioneered many of the principles applicable to the New Social Internet (Web2.0). In response to the need for children to develop Constructionist learning skills for the coming millennium, she associated the “3Rs” of traditional education (Reading, wRiting, and aRithmetic), with what she named the “3Xs,” eXploring, eXpressing and eXchanging ideas through digital media making. MaMaMedia stretched the Web1.0 technology of the first Internet era and the minds of young children of the 90’s.
When the Internet market collapsed at the beginning of the millennium, she did not lose faith in her vision and understanding of what good learning is all about. On the contrary she saw the potential of globalization and the *New Internet*.

In 2004 Dr. Harel Caperton founded the **World Wide Workshop**, and after a period of industry analysis and market research, launched **Globaloria** to help disadvantaged youth become successful participants in the global knowledge economy through the acquisition of Web 2.0 digital skills and new learning abilities for the millennium.

In 2006, the World Wide Workshop Foundation was the first to integrate *Constructionist* theory into the domains of applied social learning technology and digital literacy. The foundation team led by Idit Harel Caperton has been reviving and revising Constructionism to fit better in the age of Web 2.0. With Constructionism 2.0 they aim at developing the Constructionist Theoretical Model for the 21st Century.

In developing GLOBALORIA we upgraded the Constructionist educational philosophy, grounded in decades of research by social scientists, such as Seymour Papert and Idit Harel, who showed 20 years earlier, that social-based project-based work lead to deeper forms of learning, cognitive integration and improved approaches to further learning how to learn. *Constructionism 2.0* also employs action research and design-based research methodologies.

Unlike top-down teaching styles requiring memorization of facts, *Constructionism* calls for creation of *public entities*. Through project-based work that is computational and immersive, and publicly shared on a wiki, using learning networks and *Flash* programming tools, children *learn how to learn*. Projects are conducted in an online open workshop setting, to facilitate *syntonic* learning (*learning by doing*).

**Six Contemporary Learning Abilities**

Globaloria is unique among educational digital literacy initiatives in that it is the first program to delineate and prioritize *constructionist* activities. As we studied Web 2.0 learning environments and evaluated initial results in our early pilot projects, we found that certain activities are better than others in facilitating this kind of learning. Our starting point is a skill set we call *contemporary learning abilities (CLAs)*.
<table>
<thead>
<tr>
<th>6 CLAs</th>
<th>Activities representing each CLA, and how they are articulated and integrated in GLOBALORIA</th>
</tr>
</thead>
</table>
| 1. Invention, progression, and completion of an original digital project idea (for an educational web-game or interactive simulation) | • Brainstorming and developing game and simulation ideas and storylines (using Web2.0 tools such as wikis and blogs)  
• Choosing and researching a subject for a game design project  
• Developing an original approach to teaching the subject in an educational game  
• Writing an original game narrative and a proposal to explain it  
• Generating creative ideas for designs to express the subject of the game and the user experience  
• Planning game design execution using paper prototyping  
• Programming a game demo that illustrates the original game design and functionality  
• Programming and completing a final game  
• Developing knowledge of the game's domain or topic through game invention and creation |
| 2. Project-based learning through online project management in a wiki-based networked environment | • Coordinating the design, creation and programming of the game elements and managing the process of building it  
• Managing the project’s execution using a wiki (creating wiki pages, organizing and formatting the wiki, sharing project assets, and progress updates)  
• Managing the team work (defining and assigning team roles, coordinating tasks, and executing one's role within the team)  
• Project troubleshooting for self and others  
• Gaining leadership experience through the project management of all game production elements (e.g., design document, user flow, budget, schedule, introduction, overview, treatment, competitive analysis, teamwork, planning, managing implementation process) |
| 3. Publishing and distribution of self-created digital media | • Creating a wiki profile page and project pages  
• Integrating and publishing text, video, photos, audio, programming code, animations, digital designs on the wiki pages  
• Posting completed assignments for each course topic to wiki  
• Posting game design iterations and assets to wiki  
• Posting notes and reflections about own projects  
• Developing a blog |
| 4. Social-based learning, participation and exchange in a networked environment | • Collaborating by using Web2.0 tools, such as posting to wikis, blogs, open source help forums, Instant messaging  
• Exchanging and sharing feedback and resources with others by posting information, links, source code questions and answers  
• Reading and commenting on blogs and wiki pages of others  
• Presenting final digital projects for others – virtually in game galleries and in person in live game demonstrations |
| 5. Information-based learning, purposeful search, exploration | • Searching the Web (using Google, Wikipedia and other sources) for answers and help on specific issues related to programming games  
• Searching and finding resources on MyGLife.org network, website, and wiki  
• Searching the Web for new Flash design, animation and programming resources  
• Searching for information in support of the game’s educational subject matter and storyline |
| 6. Surfing websites and web applications | • Surfing to MyGLife.org starter kit site and other game sites and playing games online  
• Keeping track of and bookmarking surfing results that are relevant to projects  
• Browsing Web2.0 content sites such as YouTube, Flickr, Blogs, Google Tools |
Four Hypotheses

Based on the constructionist theoretical model and Six CLAs developed by the World Wide Workshop, we established four main hypotheses for our research:

Hypothesis 1: Our Globaloria technology platform, tools, resources, and game design curricula was ready to be tested in several pilot locations – middle schools, high schools and community colleges and the Randolph Technical Center had a teacher, the infrastructure, the administration and, most of all, the students who could assure successful implementation.

Hypothesis 2: When students are encouraged to engage in the kinds of activities that the Globaloria program supports, through hands-on-guidance and tutorials, they develop digital proficiencies and acquire new ways of thinking, learning and interacting that fit our description of the “6 Contemporary Learning Abilities” (6 CLAs).

Hypothesis 3: Three measurable variables that reflect changes in levels of engagement in activities that cultivate the 6 CLAs include frequency of participation, motivation towards these activities, and knowledge of language and skills required for these activities.

Hypothesis 4: Participation in Globaloria and achievement of the 6 CLAs will yield long-term beneficial personal and economic results, including improved abilities to participate and contribute to virtual networks (professional and social), and the elimination of educational barriers to various career paths.

We hypothesized that prior to Globaloria, students would have engaged mostly in the activities represented by CLAs 4, 5 and 6, and more frequently than with the activities described by the first 3 CLAs, which require a higher level of constructionist digital literacy, and would have been less motivated towards these activities due to lack of experience and knowledge. Finally, we hypothesized that Globaloria participation would result in increases in motivation towards and frequency of participation in all CLA activities.

Design-based Research. The overarching method informing our research strategy is the design-based research method. We conducted discovery-oriented research and employed deductive instruments and coding schemes. In our quantitative analysis, we tested the validity of our 6-CLA model and some of the hypotheses. Through qualitative analysis, we sought to identify the variables that drive optimal student performance and learning of the 6-CLAs, for example: school infrastructure and access, supporting resources, program implementation, class composition and individual student differences.

Behavioral, Affective and Cognitive Variables

Our research addresses behavioral, affective, and cognitive development in participants as a result of engaging in activities described in our 6-CLA model and included in the Globaloria curriculum. We focused on three variables – motivation, frequency and knowledge:

Motivation is an affective (emotionally-oriented) disposition, typically related to confidence and enjoyment in certain activities. We address motivation or affective impact by conducting pre- and post-program surveys on self-perception and motivation towards CLA-related activities.
In the self-determination theory of E.L. Deci and R.M. Ryan, motivation is towards various activities.\textsuperscript{15} Intrinsic (or self-determined) motivation is comprised of 1) the individual’s perceptions of competence (confidence), 2) autonomy (freedom of choice) and 3) social relatedness (feelings of connectedness and sharing with others). These qualities are inherent in the individual, but can also be supported by the environment. Constructionist environments cultivate intrinsic motivation and support self-determination by providing opportunities to increase competence, exercise autonomy and share with others.\textsuperscript{16} To measure motivation we used instruments developed by Deci and Ryan.\textsuperscript{17}

**Frequency** is a behavioral measure. We collected information about how often our students engaged in a particular activity through surveys and review of Wiki and blog activities in which students posted and shared artifacts, multimedia products, information and ideas. To measure frequency\textsuperscript{18} we used criteria employed by the Pew Internet and American Life Project in the majority of their national surveys of media and technology use. Our surveys measured frequency of technology use across the 6-CLAs. Increases in technology use at school due to GLOBALORIA participation are to be expected. Increases in technology use at home on students’ own time would indicate that the GLOBALORIA program was having an impact on the way that students are spending their free time, and whether they are becoming more productive computer users in their home technology use. At this time, our frequency measures combine both at-home and at-school technology activity. Increases indicate composite, overall impact on students’ technology use frequency.

**Knowledge** is defined as information, understanding, facts and ideas acquired by study, investigation, observation, or experience. Our project focuses on familiarity with and understanding of Web 2.0 digital technology as it relates to online invention, communication, collaboration, storytelling and learning. We address cognitive impact by evaluating student artifacts and tracking written and verbal comments about their work. To measure knowledge we analyzed self-reported digital knowledge items using a variation of a measure validated as predictive for actual knowledge by Hargittai.\textsuperscript{19}

The Globaloria pilot encompassed the entire state. At the end of the semester we analyzed statewide survey results, and extracted the data specific to RTC for this report. Our focus at RTC allowed us to collect empirical evidence using a combination of survey data, web log metrics and observation of activity, interviews, written and oral comments and on-site observations. In addition, we selected six RTC students, each one beginning our program in a different place, and followed their progress throughout the first semester.
The Pilot Study at the Randolph Technical Center in Elkins, WV

How We Recruited the RTC Site. RTC was the first pilot location in WV to launch Globaloria. On August 21 Denise Stalnaker, RTC Business teacher, was one of several educators invited by the WV Governor’s Office to attend a recruiting session. At this meeting the World Wide Workshop Foundation team presented a detailed overview of Globaloria, with the goal of providing attendees enough information to make a decision on whether they would sign on. At the end of this session Mrs. Stalnaker said:

I have just one problem – how can we get this started tomorrow?

With Mrs. Stalnaker leading the way RTC elected immediate participation and quickly gained approval to offer the program as an integrated daily class. We responded to Mrs. Stalnaker’s enthusiasm and entrepreneurial spirit with rapid delivery of everything needed to implement Globaloria: a Starter Kit Website, Community Wiki and Blog. RTC received the initial core curriculum syllabus in a Word document on August 23, just two days after the recruitment session. See http://www.myglife.org/usa/wv/rtcwiki/index.php/Syllabus.

In September 2007, in collaboration with Mrs. Stalnaker and Mrs. Heinke, World Wide Workshop officially launched Globaloria at RTC. By September 14 Denise Stalnaker and her co-educator, Paula Heinke, had the RTC website and wiki platform up and running. At the Globaloria Educators’ Training Workshop in Morgantown (September 27-28) they shared their experience with other teachers and the successful RTC launch served as a working example for other pilot locations.

Game Design met Monday through Friday, for a 90-minute session each school day during the fall semester for a total of 17 weeks (excluding holidays) and approximately 128 hours of class time. In January 2008 students completed their requirements and on January 15 they made Final Presentations to representatives from World Wide Workshop in attendance at RTC. Students were given a week after the presentations to revise their final game projects and post them to the RTC Wiki. Grades were issued shortly thereafter.

Community of Elkins

Located in a predominantly rural county, Elkins is a working class community (pop. 7,000). Average salary is $25,710, compared to $33,993 for the state, ($44,334 for the US). In 2007 5.5% of workers were unemployed and 29% of RTC’s students qualified for free or reduced lunch. Despite the harsh economy Elkins thrives as a small college town with a cultural bent. Davis and Elkins, a liberal arts college, provides classes for residents in arts and crafts, fiddle, clogging, storytelling and cabin making. The town sponsors art and theatre programs, students perform at the “Picking in the Park” summer festival and there are several area craft shows.
**RTC, One of 24 WV County-Level Regional Technical Centers**

Most counties in West Virginia offer technical education via regional centers, high schools, colleges and specialized facilities. Career and Technical Education programs utilize over 300 schools and are available to students in every county. The program operates 34 high schools, 24 county centers with five or more occupational areas, 7 multi-county centers, 16 colleges/universities offering career/technical education and 3 specialized facilities. The US Perkins Grant program subsidizes some of the state initiatives.

Randolph Technical Center (RTC) is a regional vocational high school, offering programs to students from Elkins, Harman and Tygarts Valley. Students specialize in one of several programs, such as Automotive Technology, Mill and Cabinet, Business Education, Masonry and Power Equipment Systems and must take at least four classes in their specialization. Some RTC classes are also offered at the high school and all students in the Globaloria-RTC program were enrolled there. Students at Elkins High have their time divided into 4 blocks of classes each day and can schedule a class at RTC during any of these blocks. Approximately 90% of Elkins High students take at least one class at RTC during their high school career.

RTC has a computer lab, with about 25 recent-model desktop Mac computers. Most students who took game design took additional classes at RTC that year.

---

**Randolph Technical Center**  

[RTC] opened its doors during the 1976-77 school year. During the past two and a half decades, literally thousands of students have received training, developed leadership skills, and grown into productive citizens via the Center. Virtually every area of employment in Randolph County can boast a graduate of the Randolph Technical Center. Graduates have become employed in professional, non-professional, technical and skilled careers. Approximately 56% of our graduates continue their education; another 42% become employed within the first three years following graduation.
Globaloria integration into RTC Course Schedule. Globaloria was implemented as an elective course called Game Design, offered for credit during school hours to students in grades 9 through 12 and integrated with the Business Education curriculum for the 2007/2008 school year. Game Design was offered in the fall semester and offered as an independent study course in the spring. No high school classes about game design, Web 2.0 activities or social networking had previously been offered at RTC.

Mrs. Stalnaker and Mrs. Heinke, who assisted throughout the fall semester, customized the Website Homepage and Community Wiki to match the RTC educational environment.

Student Backgrounds. Twenty students enrolled in Game Design at RTC, fifteen boys and five girls, 7 sophomores, 5 juniors and 8 seniors. Students represented the full range of school performance levels. The class included three special education students, several students who were taking honors/college courses and all abilities in between. All students were white. Most RTC students have roots in the local rural community and have attended public school in Elkins for their entire school career. One student was born in England but had lived in West Virginia for several years.

Students’ Prior Technology Experience. Twenty students completed the Pre-Program Survey. All but 2 respondents had used either a desktop or a laptop connected to the Internet at home and a majority used a computer several times a day. While a majority of the students reported using computers in school several times a day, most students had never engaged in the type of activities included in Globaloria, such as use of a wiki, Flash design of a game, programming, and project-based work in a team.

Denise Stalnaker’s History and Goals Mrs. Stalnaker, age 46, teaches business education to RTC students in grades 9-12. In the Pre-Program Survey she wrote:

I was born in a very small town and went to the same school from grade 1-12. I was the first person in my family to get a college education.

I have mostly worked and lived in West Virginia except for two years I lived in Texas. I now live in Elkins because living in the country was too hard when my two kids became involved with sports and band.

Until my kids graduate from high school I want to continue teaching and learning new technology skills. After they graduate I think I would like to work in private industry using my computer skills.
In discussing her career Mrs. Stalnaker said she had started out teaching keyboarding which got boring really quickly so she asked to learn more about the computer and teach advanced classes. She helped the school raise funds for a computer lab that includes digital imaging, desktop publishing, website design and business applications software.

Prior to Globaloria Mrs. Stalnaker was knowledgeable about software, hardware, blogs and graphic design and had some understanding of Flash and ActionScript but had not used a wiki, engaged in game design or worked in a design team online. She had little prior understanding of social network sites or online gaming. Most of her training was Learn it while you teach it. She had attended conferences and workshops and the RTC principal paid for her to take online basic Adobe training. She helped write the state content standards for digital imaging and Web design classes. RTC was the first school in WV to add these courses to the business curriculum.

Out of all the high school and middle school educators in Pilot Year-1, Mrs. Stalnaker was the most eager to participate in the Globaloria program and the enthusiastically engaged in the program overall. Along with many of her students, Mrs. Stalnaker was a model Globaloria learner. She created her own profile page on the RTC Wiki.

Throughout the year Mrs. Stalnaker did a significant amount of self-teaching of Flash programming and Web 2.0 technologies as she participated in the project, elevating her own skills through the exploration of online tutorials and resources in order to meet the needs of her students. Several times in our communications Mrs. Stalnaker discussed the extent to which students taught her new Flash skills, learning together as a team.

Mrs. Stalnaker’ created her own game and posted her game files online along with those of her students. It is a basic text quiz with buttons advancing the player to subsequent screens, and the content of the quiz is on the subject of digital knowledge. The quiz features questions such as: A network that is used by a single organization and is NOT accessible from the outside is a(n):a) Internet, b) Ethernet, c) intranet or d) singlenet. Her game features a few simple static graphics and a few instances of layered objects and text flying in across the screen.
Mrs. Stalnaker and Her Students Implement Globaloria. The RTC Starter Kit Website and Wiki Platform were up and running by September 14 and RTC students began accessing and using the platform three days later. Students spent the first two weeks of Game Design working on Flash tutorials and other introductory activities outlined in the syllabus.
For the first two months Mrs. Stalnaker, Mrs. Heinke and students followed the Globaloria Starter Kit website and syllabus. Prior to developing actual games they completed the activities in the syllabus to teach Flash programming, progressing through the basic core curricular elements we had mapped out and did little customization. See [http://www.myglife.org/usa/wv/rtcwiki/index.php/Syllabus](http://www.myglife.org/usa/wv/rtcwiki/index.php/Syllabus)

![RTC MyGLife Wiki Homepage (screenshot)](image)

**Figure 7. RTC MyGLife Wiki Homepage (screenshot) How to create Member Profile page.**

Students created Profile Pages on the Wiki and used these pages to express personalized information, including likes, dislikes, relevant photos, videos, and other graphical multimedia about themselves. Some students posted outside links, game reviews, and their own early game ideas on these pages. As students continued with game design assignments, they created a separate Project Page for assignments and work samples from the tutorials and syllabus activities related to programming.

![Game design topics](image)

**Figure 8. Globaloria Game Design Topics (screenshot)**

**Game Design Proposals.** In late October students wrote individual game design proposals in MSWord, going through several iterations. Each proposal contained an overview of a proposed game, a section on game treatment, a competitive analysis and an outline of team roles. Proposal letters were written in the form of a professional business communication addressed to Dr. Idit Harel Caperton. For those students who had already formed teams and discussed team projects, the individual proposals reflected team project themes, highlighted written game plans, the varying interests of individual team members and the roles they envisioned for themselves on the team, e.g. programmer, designer, project manager. At the end of the month final documents were submitted, graded and mailed to Dr. Caperton for review.
Wiki Discussion and Flash Tutorials. Around this time we noted that Mrs. Stalnaker had been using the Wiki more thoroughly and innovatively than teachers at the other pilot locations. She used the Discussion tabs to engage in dialogue with her students, who had begun to see the big picture – i.e. how tutorials in Flash programming could help them design an operable game. Mrs. Stalnaker then expressed some urgency about transitioning into the game development portion of the program and reassessed the schedule in order to push students to fully complete a functioning game in the remaining time available in the course.

Team Game Development and Proposals. In early November the students formed seven teams and began planning their games. They engaged with game development topics in the syllabus to varying degrees, depending on group roles and interests. From the start of November through January 15 they worked through these topics to complete their games.

The more advanced game development portion of Globaloria involved learning ActionScript programming to make games more interactive. In order to move into this segment of the program, the students created a second proposal, this time as a team, integrating plans from their design documents into digital format as a slide presentation. This was not in the core curriculum – Mrs. Stalnaker introduced this assignment to allow students to apply their knowledge of incorporating buttons and text. Students posted these proposals on a special class wiki page, then to Team Game Proposal and Final Games pages. Mrs. Stalnaker created hard-coded links to these pages from the Homepage for student and visitor access.


Game Design Grading. Students received letter grades for the Game Design class as for other classes at RTC. Mrs. Stalnaker divided the course into segments with performance on each segment counting for a fixed percentage of the total grade.

Our Globaloria Team Visits RTC Educators and Students. Throughout the Fall Semester our World Wide Workshop team engaged in many interactions with Mrs. Stalnaker to provide support to her and her students and collect research data. During Semester 1 Program Manager Lee Kraus made several site visits from his local post in WV. We also instituted a process in which educators reported on student progress at their pilot location in a Stipend Report prior to receiving funds. Our communications included:

- four conference call interview sessions among our Director of Research, Program Director and Mrs. Stalnaker in October, November and December
- dozens of email messages to and from our team members and Mrs. Stalnaker
- communication on the Globaloria-WV Educator Wiki and blogs
- in-person site visits
As Mrs. Stalnaker approached the end of Semester 1, she began to see that she would need a more consistent way to grade final game projects. At the same time we were developing our own ideas about coding and evaluation of students, knowledge measurement and evaluation tools for educators in all pilot locations. The goal is to communicate expectations to educators and students, upfront and during the creative process. Mrs. Stalnaker shared her evaluation rubrics with our team and we offered feedback. At our suggestion she posted them to the Educator’s Wiki at the end of January. The final result was the collaborative development of two evaluation rubrics, one for grading RTC students’ final game projects and another for students’ live presentations to our American Idol-style panel of World Wide Workshop Foundation and Advisory Board judges. This collaboration enabled the Globaloria team to develop an evaluation system for teachers which will become a core element of the curriculum.
## Game Evaluation

**Teacher Name:** Denise Stainaker

**Student Names:**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Points Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperative work</td>
<td>The group worked well together with all members contributing significant amounts of quality work.</td>
<td>The group generally worked well together with all members contributing some quality work.</td>
<td>The group worked fairly well together with all members contributing some work.</td>
<td>The group often did not work well together and the game appeared to be the work of only 1-2</td>
<td></td>
</tr>
<tr>
<td>Accuracy of Content</td>
<td>All information questions made for the game are correct.</td>
<td>All but one of the information questions made for the game are correct.</td>
<td>All but two of the information questions made for the game are correct.</td>
<td>Several information questions made for the game are not accurate.</td>
<td></td>
</tr>
<tr>
<td>Attractiveness</td>
<td>Contrasting colors and graphics used to give the game visual appeal.</td>
<td>Contrasting colors and at least 1 original graphic were used to give the game visual appeal.</td>
<td>Contrasting colors and &quot;borrowed&quot; graphics were used to give the game visual appeal.</td>
<td>Little or no color or fewer than 3 graphics were included.</td>
<td></td>
</tr>
<tr>
<td>Creativity</td>
<td>The group put a lot of thought into making the game interesting and fun to play as shown by creative.</td>
<td>The group put some thought into making the game interesting and fun to play by using textures, fancy.</td>
<td>The group tried to make the game interesting and fun, but some of the things made it harder.</td>
<td>Little thought was put into making the game interesting or fun.</td>
<td></td>
</tr>
<tr>
<td>Rules</td>
<td>Rules were written clearly enough that all could easily participate.</td>
<td>Rules were written, but one part of the game needed slightly more explanation.</td>
<td>Rules were written, but people had some difficulty figuring out the game.</td>
<td>The rules were not written.</td>
<td></td>
</tr>
<tr>
<td>Knowledge Gained</td>
<td>All students in group could easily and correctly state several facts about the topic used for the game without looking at the game.</td>
<td>All students in the group could easily and correctly state 1-2 facts about the topic used for the game without looking at the game.</td>
<td>Most students in the group could easily and correctly state 1-2 facts about the topic used for the game without looking at the game.</td>
<td>Several students in the group could NOT correctly state facts about the topic used for the game without looking at the game.</td>
<td></td>
</tr>
</tbody>
</table>

**Total Points**

Total Points X 4 then add 4 bonus points if deserving—Final Grade

---

*Figure 11. Evaluation of Game Design Assignment*
## Group Game Presentation

**Teacher Name:** Denise Stalnaker  

**Student Names:**  

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Points Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparedness</td>
<td>Student is completely prepared and has obviously rehearsed.</td>
<td>Student seems pretty prepared but might have needed a couple more rehearsals.</td>
<td>The student is somewhat prepared, but it is clear that rehearsal was lacking.</td>
<td>Student does not seem at all prepared to present.</td>
<td></td>
</tr>
<tr>
<td>Posture and Eye Contact</td>
<td>Stands up straight, looks relaxed and confident. Establishes eye contact with everyone in the room during the presentation.</td>
<td>Stands up straight and establishes eye contact with everyone in the room during the presentation.</td>
<td>Sometimes stands up straight and establishes eye contact.</td>
<td>Slouches and/or does not look at people during the presentation.</td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>Shows a full understanding of the topic.</td>
<td>Shows a good understanding of the topic.</td>
<td>Shows a good understanding of parts of the topic.</td>
<td>Does not seem to understand the topic very well.</td>
<td></td>
</tr>
<tr>
<td>Speaks Clearly</td>
<td>Speaks clearly and has no mispronounced words to one word.</td>
<td>Speaks clearly and distinctly, but mispronounces a few words.</td>
<td>Speaks clearly and distinctly most of the time. Mispronounces several words.</td>
<td>Often mumbles or cannot be understood OR mispronounces more than one word.</td>
<td></td>
</tr>
<tr>
<td>Originality</td>
<td>Presentation shows a large amount of original thought. Ideas are creative and inventive.</td>
<td>Presentation shows some original thought. Work shows new ideas and insights.</td>
<td>Uses other people's ideas (giving them credit), but there is little evidence of original thinking.</td>
<td>Uses other people's ideas, but does not give them credit.</td>
<td></td>
</tr>
</tbody>
</table>

**Total Points**  

Total Points X 4 then add 4 bonus if deserved—Final Grade
Quantitative Analysis: Pre and Post Program Survey Data

During the first semester we collected data in many forms. We conducted three online surveys for all Globaloria sites in West Virginia: a Pre-Program Survey on October 4, 2007, a Curriculum Feedback Survey on December 15 and a Post-Program Survey on January 17, 2008. We distributed the surveys to educators by email and Wiki Homepages. Teachers shared the Web links to the surveys with students.

At RTC pre-program survey data were collected about two weeks after students gained access to the Globaloria Starter Kit Website and Wiki platform for learning. For the pre-program survey, N=20; for the post-program survey, N=18. Average age of participants was 16.5 (SD=1.1). Average grade level was 11.0 (SD=.94, min=10, max=12). Fifteen males and five females completed the pre-program surveys.

Initially, we asked about home computer ownership, network connections and personal use of a desktop or laptop computer.

<table>
<thead>
<tr>
<th>1. Do you, personally, use a computer at home (desktop and/or laptop)?</th>
<th>Response Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop</td>
<td>66.7%</td>
</tr>
<tr>
<td>Laptop</td>
<td>0.0%</td>
</tr>
<tr>
<td>Both desktop and laptop</td>
<td>23.8%</td>
</tr>
<tr>
<td>None of the above</td>
<td>9.5%</td>
</tr>
</tbody>
</table>

*Figure 13. Computer Ownership*
Factor Analysis of Survey Items Related to 6-CLAs. To validate our theoretical categorization of the 6-CLAs, we applied factor analysis to the pre-program survey items representing each CLA category, within the full WV dataset (N=81). Several items were asked for each category. Factor analysis results confirmed there to be a total of 8 factors, instead of 6: CLAs 1, 3, 4, and 5 plus 2 factors for CLA 6 (surfing and gaming), and 2 factors for CLA 2 (creating with digital media and collaborating with team members online). We therefore performed additive combinations for each set of items' means to reflect the factors identified (four single factors, and two factors separated into two sub-factors). Survey items that did not factor into categories were excluded from the final combinations. After combining the factors on the full dataset, we segmented the RTC findings and analyzed these pre- and post-survey results separately.24
Measuring Frequency. We measured frequency of technology use for CLA activities, at home and at school, before and after Globaloria by asking students to indicate on a 7-point scale how often they participated in these activities. Increases in computer use at home for CLA-related activities indicated adoption of the skills learned at school.

![Figure 15. Survey question on students’ frequency of engagement in Six CLAs (screenshot)](image)

Note: Itemization derived from the Pew Internet and American Life surveys of U.S. Internet use.

**Figure 16. Frequency of Computer Use**

*Most students who used a computer “elsewhere” gave “friend’s house” as the other location.

Measuring Motivation. Motivation was measured using a 5-point scale. We asked students to assess their levels of confidence and enjoyment in specific CLA-related activities. In our data analysis we combined the variables of confidence and enjoyment into a single variable labeled motivation.
Measuring Knowledge. Question 28 on the Pre-Program Survey presented a list of 21 technology terms that were chosen to reflect a broad range of CLA activities. Student responses for all the terms were combined into a composite variable.26

Pre-Globaloria CLA-Related Activities. Prior to their participation in Globaloria it appears students engaged more frequently in activities associated with CLAs 4, 5 and 6 -- surfing, social-based exchange and information-based exploration -- than with activities described in CLAs 1, 2, and 3 -- project-based learning/expression, online publishing/distribution and invention/progression of an original project idea. It appeared that students were also slightly more motivated to engage in activities associated with CLAs 4, 5 and 6 than those associated with CLAs 1, 2, and 3.

Variations in degree of pre-Globaloria motivation may be due to students’ unfamiliarity and lesser frequency with activities related to the first three CLAs. Also, the first 3 CLAs require significantly more effort, and thus, the easier activities (surfing, information-seeking, socializing online) may have been more attractive prior to participation in Globaloria.

Globaloria students at RTC had little experience with the more Constructionist activities (invention, progression, and completion of an original project idea; project-based learning and project management in a networked environment; and publishing and distribution of digital media). Most students had not used a wiki, designed a graphic, developed an interactive game, put together a design team, used programming software, posted creative files or worked on a digital design team online. Several students had used a blog and designed graphics, thought up ideas for a game project and posted creative files online. A few students had prior computer programming experience.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used a wiki?</td>
<td>31.6% (6)</td>
<td>68.4% (13)</td>
</tr>
<tr>
<td>Used a blog?</td>
<td>52.6% (10)</td>
<td>47.4% (9)</td>
</tr>
<tr>
<td>Designed graphics on a computer?</td>
<td>31.6% (6)</td>
<td>68.4% (13)</td>
</tr>
<tr>
<td>Thought up an original idea for a game project?</td>
<td>63.2% (12)</td>
<td>36.8% (7)</td>
</tr>
<tr>
<td>Developed an interactive game from beginning to end?</td>
<td>5.3% (1)</td>
<td>94.7% (18)</td>
</tr>
<tr>
<td>Put together a team to make it happen?</td>
<td>15.8% (3)</td>
<td>84.2% (16)</td>
</tr>
<tr>
<td>Done any computer programming?</td>
<td>31.6% (6)</td>
<td>68.4% (13)</td>
</tr>
<tr>
<td>Posted creative files like graphics, animations or games, to the internet?</td>
<td>47.4% (9)</td>
<td>52.6% (10)</td>
</tr>
<tr>
<td>Worked in a team on a digital design project, online?</td>
<td>10.5% (2)</td>
<td>89.5% (17)</td>
</tr>
</tbody>
</table>

Figure 19. Prior Interactive Computer Activity
Figure 20. RTC Students’ Frequency of Technology Use, by CLA type, prior to Globaloria

Figure 21. RTC Students’ motivation toward technology use by CLA type, prior to Globaloria
**Possible Misinterpretation of Questions.** The number of students who report previous use of a wiki was somewhat surprising. It is possible that students interpreted *used a Wiki* as having visited Wikipedia as a source of information in an online inquiry search. Continued survey instrumentation will distinguish between basic informational reading of Wikipedia content and project-based contribution of original content in the Globaloria Wiki platform environment. The question “Have you ever developed an interactive game from beginning to end?” was followed by “Have you ever put together a team to make it happen?” Some students missed the connection, answering “no” to the interactive game experience and “yes” regarding teamwork.

**RTC Students and the Customized Wiki.** The Globaloria Website and Wiki Starter Kit was made available to RTC on September 14. Students used the Wiki for self-presentation, management of projects and files, and team collaboration and feedback. Wiki use data present evidence of specific behavioral actions taken by students as they use our tools and resources. It shows to what extent the level of Web 2.0 activity increased as a result of Globaloria and which aspects of project management and collaboration need to be supported to a greater extent. This data confirms what we learned from the students through interviews, presentations and survey self-report forms and greatly adds to the picture of student engagement.

To measure total number of wiki edits monthly, we mined the RTC user log files and hand-generated tallies from the wiki’s “User Contributions” page – a feature built into the wiki architecture. This data includes: editing a wiki page, saving at any time, re-editing the same page and saving a moment later, uploading files, and commenting on others’ work.

The number of Wiki edits made from September through January by all students was 4091. The mean number of edits per month was 818. The mean number of edits per month, *per participant*, was 42. (Appendix A, *Aggregate Wiki Edits by User*) The mean number of file uploads per user was 27 for the five months of the semester (min = 8, max = 48). Figure 40 shows the total Wiki activity by month for all RTC game design students, indicating they used the Wiki to the greatest extent in October, while learning how to use the platform and creating online identities. Figure 41 shows the average number of student edits per month. On average, in October, the highest activity month, each student made about 4 edits to the Wiki each school day.
Figure 22. Total monthly Wiki edits by RTC Game Design students

Figure 23. Average monthly Wiki edits per RTC Game Design student

Most students used the Wiki to a greater extent at the beginning and end of the semester. Wiki use dropped off in November and December when students were learning to program with Flash software. Wiki edits picked up again in January for final project postings and preparation of final presentations.

We also measured individual activity in more detail to identify specific elements each student chose to include on a wiki page. We created a coding scheme with three utilization criteria: self-presentation; management of projects and files; and team collaboration and feedback and applied this coding scheme at the individual level to measure the total number of site visits made by students each month and kinds of actions taken. We segmented our coding scheme into two sets: one for attributes of Profile pages and another for attributes of Project Pages. The coding scheme for this research step was based on our observation of how most students used the RTC Wiki.
(Appendix B, *Tally Sheet for Attributes on Profile and Project Pages*). Through this analysis we determined that greater support is needed throughout the school year to encourage wiki use as a tool for project management and team collaboration.

**Game Quality Evaluation.** Games can reflect a broad range of approaches to narrative, form, and functionality. We coded and scored each team game using an evaluation procedure developed with the help of a game design consultant. (Appendix C, *Webgame Evaluation*) This coding system contains 80 possible elements that might be included by a beginner. Our seven RTC teams scored a mean of 22 on the Semester 1 game projects (min = 13, max = 30). All games used the same quiz genre.

**Comparative Analysis of Pre- and Post-Program Survey.** Students reported increases in their motivation towards the CLAs of online publishing (CLA 3) and creating with digital media (CLA 2) – more Constructionist dimensions of our contemporary learning abilities framework. Motivation is considered a trait that under normal circumstances remains quite static. Therefore increases in this variable are considered to be of particular significance. This result indicates that the Globaloria program was effective in changing trait qualities of confidence and enjoyment toward CLAs 2 and 3. We take this result as an early indicator of the program’s affective impact on students — after just one semester.

Survey data show an increase in frequency of engagement in the CLA activities of surfing (CLA 6), information-seeking (CLA 5), online socializing (CLA 4), and creating with digital media (CLA 2). *Creating with digital media* is one of the more Constructionist CLAs, and this result provides us with quantitative evidence of a behavioral increase associated with Globaloria.

Finally, the comparative analysis of pre and post program data shows a significant increase in RTC students’ self-reported knowledge of technological terms, from 3.3 to 3.8 ($t=3.19, p<.01$), as measured by the composite technology knowledge variable. This result presents evidence of cognitive impact.

Because we had a relatively small sample size, several of the increases did not achieve statistical significance. Nevertheless, the results indicate a positive trend that might be confirmed given a larger sample. (See Appendix D, Changes in RTC Students’ 6 CLAs, from Pre to Post Program: Frequency and Motivation.)
Table 4. Increases in RTC Students' Frequency and Motivation for Engaging in Activities Reflecting the 6 Contemporary Learning Abilities, Due to Participation in Globaloria

<table>
<thead>
<tr>
<th>Activity</th>
<th>CLA Number</th>
<th>Frequency (7-point scale)</th>
<th>Motivation (5-point scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfing</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surfing for information</td>
<td></td>
<td>Increased, 4.6 to 5.2*</td>
<td>Static, 4.6 to 4.6</td>
</tr>
<tr>
<td>Surfing for gameplay</td>
<td></td>
<td>Slight increase, 4.8 to 4.9</td>
<td>Slight increase, 4.4 to 4.5</td>
</tr>
<tr>
<td>Information-seeking</td>
<td>5</td>
<td>Increased, 5.1 to 5.6*</td>
<td>Increased, 4.0 to 4.4</td>
</tr>
<tr>
<td>Socializing and communicating online</td>
<td>4</td>
<td>Increased, 4.2 to 5.0*</td>
<td>Increased, 4.1 to 4.4</td>
</tr>
<tr>
<td>Publishing and distribution of digital media</td>
<td>3</td>
<td>Increased, 3.5 to 3.9</td>
<td>Increased, 3.1 to 3.7*</td>
</tr>
<tr>
<td>Project-based learning and project management</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating with digital media</td>
<td></td>
<td>Increased, 2.3 to 3.6*</td>
<td>Increased, 3.3 to 3.7*</td>
</tr>
<tr>
<td>Collaborating with team members online</td>
<td></td>
<td>Increased, 1.6 to 4.0***</td>
<td>Slight increase, 3.9 to 4.0</td>
</tr>
<tr>
<td>Invention, progression, completion of project idea</td>
<td>1</td>
<td>Static, 4.5 to 4.5</td>
<td>Not asked</td>
</tr>
</tbody>
</table>

* p<.05
** p<.001

Only asterisked results achieved statistical significance

T-test statistics available upon request.

1 See Table 2 for examples of activities representing the 6-CLAs.

A majority of students reported regularly using the class Wiki, blogs, and social network sites from a home computer and a large number said they used the home computer to design graphics, think up original ideas for an interactive game project, and post creative files to the Internet (Table 5). Prior to Globaloria most students had never engaged in these activities. These changes indicate that Globaloria was effective in prompting self-directed constructive engagement with technology. (Because Flash software was not typically installed at home, except for free 30-day trial period, students could not use their home computer for game design).
If you have a computer AT HOME, do you use it for any of the following activities? Yes No

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a wiki?</td>
<td>55.6% (10)</td>
<td>44.4% (8)</td>
</tr>
<tr>
<td>Using a blog?</td>
<td>50.0% (9)</td>
<td>50.0% (9)</td>
</tr>
<tr>
<td>Using Flash?</td>
<td>23.5% (4)</td>
<td>76.5% (13)</td>
</tr>
<tr>
<td>Using Photoshop?</td>
<td>17.6% (3)</td>
<td>82.4% (14)</td>
</tr>
<tr>
<td>Designing graphics?</td>
<td>35.3% (6)</td>
<td>64.7% (11)</td>
</tr>
<tr>
<td>Thinking up an original idea for an interactive game project?</td>
<td>38.9% (7)</td>
<td>61.1% (11)</td>
</tr>
<tr>
<td>Developing and creating an interactive game?</td>
<td>16.7% (3)</td>
<td>83.3% (15)</td>
</tr>
<tr>
<td>Working with a team on a digital design project, online?</td>
<td>22.2% (4)</td>
<td>77.8% (14)</td>
</tr>
<tr>
<td>Programming (e.g., in ActionScript)?</td>
<td>16.7% (3)</td>
<td>83.3% (15)</td>
</tr>
<tr>
<td>Posting creative files like graphics, animations or games, to the internet?</td>
<td>33.3% (6)</td>
<td>66.7% (12)</td>
</tr>
<tr>
<td>Using social network sites like MySpace or Facebook?</td>
<td>77.8% (14)</td>
<td>22.2% (4)</td>
</tr>
</tbody>
</table>

RTC game design students enjoyed the new experience offered by Globaloria. About half of the class said they intended to regularly participate in all of the activities related to CLAs 1, 2, and 3 (Table 6). Several students indicated an intention to continue computer programming and online digital design, reflecting their adoption of the practices learned and an inclination to apply their new skills moving forward.

Overall, the quantitative results provide support for the finding that Globaloria-WV participation had a positive effect upon students’ affects towards constructive technology, their behavioral frequency of engagement, and their self-reported knowledge.
Qualitative Analysis: Feedback and Outcomes

Educational Environment and Physical Resources. Our choice of RTC as a research site was fortuitous. The computer lab and technology equipment were highly reliable. Lead teacher Mrs. Stalnaker, her assistant Paula Heinke, RTC administrators and enthusiastic students all contributed to a successful first semester.

Curriculum Feedback Survey. To learn about students’ practical experience and subjective engagement with the technological tools and curriculum, we conducted an on-site Curriculum Feedback Survey towards the end of the semester, on December 15, 2007. We queried students about their interaction with the MyGLife.org Starter Kit website, its tutorials and resources and the custom-built Wiki platform. The survey was composed of fifteen open-ended questions, such as:

- What are 2 things you like about this class?
- What are 2 things you dislike about it?
- What was the one thing you found most difficult?
- How do you think this class is helping you prepare for your future career?

We aggregated responses to each question and reviewed and coded each response to reflect common trends across the group. Findings from the Curriculum Feedback Survey were highly illuminating and allowed us to create a set of iterative changes to the MyGLife.org platform and curriculum while the pilot was ongoing. Feedback from RTC students was critical for the state-wide program. As RTC had started the program a full month earlier than the other pilot locations and with daily class meetings students were spending significantly greater amount of time with the project than other sites, early RTC feedback allowed the Globaloria team to anticipate hurdles and make modifications to the platforms across all pilot locations as well as to better support students continuing the program in Semester 2.

Constructionist Activities. Students engaged in information-seeking (CLA-4) by mining the MyGLife.org game design and Web 2.0 tutorials and by searching more widely online for additional tutorials and resources to support their independent game design learning. They engaged extensively in project-based learning and project management (CLA-3) in their individual completion of assignments as well as collaborative team game design projects. Students participated in online publishing and distribution of their digital design artifacts (CLA-2). They learned to value and enjoy working in teams, sharing and discussing specific artifacts, improving the work of individual and teams, seeing their peers’ creativity shine through and socializing in wikis and blogs. Through design documents, open-ended survey responses and spoken expression and reflection during formal presentations, students evidenced inventiveness about game themes and content (CLA-1). The program cultivated new interests among students who had not previously been exposed to project-based work and strengthened existing interests among those who came into the project with a preconceived idea of preferred team roles and personal strengths.

Students created and used their Profile and Projects pages on the Wiki to manage their required assignments, and continued posting files and text to the Wiki at varying levels across the school year. The more students use the Wiki for posting team files, the greater is their contribution to their team’s game project. It may be that for participants, seeing their collection of work on the Wiki enabled them to gain a more complete picture of the ideas they had generated, allowing
them to create artifacts reflecting their ideas, to keep their ideas central in a visible online projects page, and to continue to build upon them. Student feedback suggested the Wiki could have been better organized to enable them to easily access resources and classmates’ work.

Software. Students mastered a beginning level of Flash programming, mostly using the timeline feature to create the progression of quiz screens presented in their games. Prior to Globaloria students had not engaged in Flash programming with the exception of one student who had used software to a very limited extent. In the Feedback Survey students said they enjoyed using Flash and were grateful for this learning experience. Certain tutorial resources were more effective than others in supporting their Flash learning, and we are continuing to refine our Starter Kit website with expanded tutorial resources including video Flash tutorials. Additionally, live expert resources are being bolstered to further support personalized student learning in the moment they need design and programming help to advance their expertise.

While many found ActionScript difficult, very few disliked it. Some students began to experiment with ActionScript to integrate a greater level of interactivity into their games. Teams that employed ActionScript expertise were able to construct more complex games.

Tutorials. Students were not entirely satisfied with the tutorials. Several felt the tutorials did not provide them with the necessary skills for meeting their game design goals. They reported both technical and conceptual trouble with the array of tutorials, both the ones developed specifically for Globaloria and those selected from the Internet. They suggested video tutorials and more visuals would be helpful.

In general student feedback suggested that more personalized assistance in game design is needed to achieve goals. This commentary may in part reflect frustration with the self-teaching process. However, the developers of Globaloria believe that learning how to self-teach with tutorials online is an essential 21st century skill. Nonetheless, this was fairly ubiquitous feedback from the students, as was the feedback that students need more hands-on personalized Flash guidance from a live expert. We are reviewing this feedback and implementing changes to the platform and curriculum in response.

Game Themes and Educational Content. In several instances students were not able to carry initial creative design of game themes into the implementation process. (See case studies below.) If themes presented in these initial design documents had been sustained, some games would have risen to higher levels of educational value. For final game projects see: http://www.myglife.org/usa/wv/rtcwvWiki/index.php/Final_Games

Individual Freedom, Creativity and Teamwork. Many students liked the freedom built into the course, enabling them to progress at their own pace. Students enjoyed experiencing the creativity that surfaced in themselves and in their peers through teamwork. They expressed an interest in creating games with more mature or sophisticated themes for older audiences. Several students see Flash, group work, programming and working without a teacher as the most important attributes of Globaloria. In contrast, several students disliked the fact that the teachers were learning alongside the students.

Globaloria builds open source norms for an educational network. Students create and share artifacts such as code, project files and game assets, as well as design knowledge and expertise. Some students become leaders by sharing knowledge and elevating the overall performance of the group as a whole.
**Best Work.** When asked to provide links and details about their “best work” of the semester, students provided links and brief descriptions of the following project-based work:

- Game proposals
- Wiki pages (“Samples”) which contain notes and tutorial assignment files
- Flash file created for the final team project
- Final team project file
- Project file from another team for which the student created an ActionScript

The variation in responses to the *Best Work* query reflects the openness present in the curriculum which allows students to identify and work on tasks of special interest, thereby enhancing motivation and enjoyment in learning. Using Web 2.0 tools for game design it provides an opportunity for students to try out a broad range of roles and activities. Students have a chance to experiment and hone their interests and preferences.

**Continued Interest in Globaloria as a Course.** Students were highly enthusiastic about Globaloria. In the Curriculum Feedback Survey a majority of students report they would like the opportunity to continue. Of these seven hoped to continue Globaloria work at Marshall Community Technical College (MCTC) and earn independent study credit. Nine students said they would like (or “love”) to take Game Design offered at MCTC but are prevented for a variety of reasons, such as lack of tuition funds or course schedule conflicts. These results confirmed other data analysis.

**Cultivation of Career Interests in Technology.** Students described new and strengthened career interests in programming, graphic design, technology project management and digital music.

- **Game design** Six students expressed a career interest in game design of which three had adopted this interest as a result of Globaloria.
- **IT and computer science** Four students indicated an interest in technology careers and credited Globaloria for provided a foundation for such careers.
- **General interest** Several students said Globaloria had stimulated a general interest in technology.

**Enhanced Life Skills.** Students described what they liked, found important, and felt they learned and expressed enhanced value for these skills not part of traditional curricula:

- Self-teaching (despite complaints about not having expert help on hand during class)
- Improving time management in project-based work
- Engaging in and coordinating effective team work and roles
- Enhanced appreciation for the focus and attention needed for productivity
- Enhanced appreciation for project-based digital design work in Flash
- Enjoyment in socializing and working closely with people they wouldn’t otherwise engage with at school, transcending the social boundaries of youth cliques.

Students offered these beneficial outcomes in response to an open-ended question, *without prompting from us, or their teachers.* Globaloria seeks to promote these skills because of their importance in so many areas of work and social life and, indeed, the program appears to be successfully eliciting positive results in students on these counts.
**Time allotment, Scheduling, Integration with Curriculum.** As the RTC class met daily for ninety minutes and was an integrated course for credit, students had more time on task and were able to accomplish a significant amount in one semester. Only one other pilot location in Pilot Year One had the advantage of this integrated format. Teams could have used more time to complete their games as originally conceptualized. Students posted many graphic design elements on their website pages that they did not use in their final games.

**Knowledge.** Our self-report data for knowledge also indicated a statistically significant increase. However, self-reported measures of knowledge need to be confirmed for their validity in reflecting actual knowledge gained. Refining our methods for measuring actual knowledge will continue to be an area of focus in our research. As for game narrative development as an example of knowledge advancement, several students indicated an interest in the subject of their game project such as themes, such as the endangered coho salmon, a local concern. We will endeavor to encourage students to address social themes and create more meaningful games.

**Project Management.** Several students indicated a preference for the project management role with possible career implications. For example, Cassie took on a highly active role managing her teammates (all boys), and became the official team project manager.

**Leadership.** Pilot Year-1 provided ample evidence of the contribution Globaloria made to individual self-confidence and self-awareness as well as digital proficiency. Globaloria provided opportunities for students to become leaders in varying capacities. (See case studies below.)

**Resourcefulness and Self-Teaching.** Students in Globaloria actively and frequently used web-based resources, World Wide Workshop Foundation experts and classmates to solve design and narrative problems. Although several students indicated they would have preferred a teacher with more expertise in Flash programming for game design, independent problem-solving is, in fact, a key facet of the Globaloria learning formula.

**Teamwork.** Few students at RTC had ever engaged in teamwork for learning. In Globaloria, they created games in teams, negotiating team roles and integrating individual contributions into final, operable interactive games. They did so using a Wiki to manage and share game project files, assets and code. Students also provided feedback to one another on the Wiki towards improving their game design. Groups succeeded in teamwork to varying extents, and we are exploring further supports to enhance effectiveness of team game design moving forward.

**Sociability.** RTC students engaged in surfing and socializing on the Wiki with their peers, as evidenced by informal and humorous comments on teammates’ Wiki Profile Pages and in the Discussion tabs, promoting team camaraderie.
Case Studies

To convey a richer sense of the process and impact the program had on individual students, we conducted six case studies. The students we selected represented a cross-section of the RTC pilot group with respect to 1) gender; 2) age; 3) academic abilities; 4) prior technology experience and 5) levels of involvement and progression in the program. We developed the case studies by collecting data from the following sources:

- Pre- and post-program survey responses to multiple choice and open-ended questions
- Written student design documents on paper
- Team game proposals created in Flash and posted to RTC Wiki
- Game design artifacts (digital, posted to RTC Wiki)
- Videos and transcriptions from site visits on Sept. 27, Nov. 28 and Jan. 16.
- Student Profile and Project Pages
- Wiki activity logs
- Evaluation of team game artifacts
- Educator interviews and email exchanges

Cassie

Cassie was a 17-year old senior at Elkins High School. Her academic transcript shows she is a high-achieving student, receiving mostly A’s. During the fall semester Cassie was elected by her fellow students to be Homecoming Queen.

In September when our Foundation team visited RTC and students were asked to introduce themselves, Cassie spoke briefly. She said she had little technology experience beyond a basic computer class, which she described as “mostly just typing.” In the Pre-Program Survey, Cassie reported Internet use of a few times a week or less and low confidence in computer activities that are creative or involve gaming. Cassie represents a high-achieving student with no prior technology skills who, despite her strong potential, ambition and performance in traditional education to-date, is under-prepared for the world of 21st century learning and work cultures. Cassie describes her purpose in taking Game Design and goals:

*I hope to grasp a better understanding of computers. I was motivated to take this class because of my lack of technological abilities. I plan to go to WVU for four years and then to the dental school at WVU.*
Like all the RTC students Cassie started off the year working individually on her game design assignments. Cassie’s user profile page includes several work samples, including assignments such as buttons, animation and a sound effect. During the early sessions her artifacts include several graphic design elements.

*This is my character that I created. She is a princess that can turn mean boys into frogs and frogs into gentlemen!*

When the class transitioned into team work, Cassie joined three boys (Clint, Chad and JT). They named their team *The Level 50’s*. The team plan connects the game narrative to a local event – demolition of a deserted school. This choice gave meaning to *The Level 50’s* game. The plan also incorporates specific educational objectives – fact recognition, problem-solving and application of knowledge. The audience for their game was grade school children.

A month into the Globaloria program, Cassie learned what a game design document is and how to craft a proposal letter. Cassie’s Game Design proposal highlights the importance of this step in the game design process. Cassie writes:

> “The Haunted Schoolhouse” takes place at a deserted school where our current football games are played. There are rumors that the school is haunted. Since demolishing the old school has caused so much controversy in our hometown, we thought that it would be creative to use this setting for the platform of our game. The game will enable the player to recognize facts, solve problems, and apply their knowledge to answer trivia questions.

The Competitive Analysis section of the Design Proposal calls for interpretation of game media: Although Cassie reported having little prior experience in gaming, it is apparent she values the need to engage users with adventure elements and a range of functions. Her statement demonstrates critical thinking about the content and purpose of her game.

> Our game sends users on a captivating adventure while maintaining the educational aspects. Our game has more functions than a point and click game. Billy Bear’s Haunted Schoolhouse was not educational at all. One False Move did not even have a setting. There was no background. A Haunted Schoolhouse acted as an I-Spy game. Our game title will catch the attention of our audience immediately. The player will have a sense of the creepy atmosphere as they begin their journey.
In her Design Proposal, Cassie speaks in the first person, indicating that she was the author of that particular screen which also reflects her written proposal and was responsible for this combination of educational and adventuresome context. She suggests that the Haunted Schoolhouse game falls within the educational, role playing and adventure game genres.

**My team consists of myself and three other members. Our game will satisfy our intended audience, because the educational aspects of the game also work as entertainment. Kids will think they're running from scary creatures in a haunted school when, at the same time, they will strategically answer questions. Our creatures are going to be scary creatures: ghosts, werewolves, witches and vampires.**

The Level 50’s included several design artifacts for their game on the Proposal Page, along with the Flash graphics. Cassie created and contributed an image for the Introduction page. This image appeared on the wiki Proposal Page and other team members suggested several versions of scary creatures that were not included in the final game. For their final game the team used only a small number of the images they had previously created and included on the Proposal Page. The 2-month design process resulted in a final game, expanded to include several new screens and images. The game requires the user to find and click on various buttons on the screen to start the game and proceed through several screens. For instance, users can click on several points in the hallway to receive trivia questions shown on the subsequent screen.
The haunted school
Enter if you dare!!!!

Opening Screen

Game context and rules

Haunted Hallway: Click objects to advance

One of several history trivia questions: Answer correctly

CORRECT!!!
YAY!!!

Feedback screen: Choose to continue

Haunted closet: No challenges “Easter Egg” with humorous surprise

Figure 28. Haunted Schoolhouse Game - Level 50’s (series of screenshots)
**Cassie’s Wiki Activity**

Table 4 shows the total number of edits made by Cassie, including editing any wiki page and saving, re-editing the same page and saving a moment later, uploading files and commenting on her classmates’ work.

Cassie made an extensive number of edits to Profile and Project pages. Her wiki activity was below the class mean in September, which may reflect her initial hesitance to use the technology. Her activity then rose above the mean in October, November, and December. She slowed down somewhat in December and January, likely due to the winter school holiday and the close of the semester. In January, it was slightly below the mean.

Cassie made a total of 34 wiki uploads, out of a class average of 26. While she said her prior technology expertise was quite low, by the end of the semester, she contributed a greater amount of material to the Wiki than the majority of her classmates. This data supports Cassie’s own statements regarding her growing confidence in using Web 2.0 technology.

**Cassie’s Profile Page**

Cassie’s Profile page features her likes and dislikes which reflect answers to an initial set of questions we provided to students to get them started in their Wiki work. Her page features ten comments from others, posted in the Discussion tab of her Profile page where she has also posted the text of her Design Proposal. She does not include any photos, video or other multimedia. Cassie herself commented eleven times during this timeframe on other students’ wiki pages. She features a link to her Project Page and three other links.

**Cassie’s Project Page**

Cassie’s Project Page features 13 assignment files, containing the projects required by Mrs. Stalnaker (the mean for the class was 9.85).

**Cassie’s Final Game Page**

She used the Project Page primarily to post the assignment files but has 2 comments from classmates on this page. Cassie’s team game is featured in the Final Games page for the class with those of the other teams. Out of 20 students Cassie had 43 attributes included on these two pages, compared to a mean of 41.

Cassie’s team posted a total of 24 game files to the Game Proposals Page, making this screen quite long, but ensuring that the files were available to classmates. This approach indicates awareness of wiki potential. Some other teams created their own page in addition to their Profile and Project Pages where they posted files for their Final Game. Posting a large number of artifacts on shared team pages shows students’ interest in gaining recognition for their work.

**Cassie’s Final Team Presentation**

On January 16, 2008 a panel of World Wide Workshop team members along with some advisory board members attended a session at RTC during which students presented their final games.

---

<table>
<thead>
<tr>
<th>#/Wiki Edits</th>
<th>Class Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep. 07</td>
<td>24</td>
</tr>
<tr>
<td>Oct. 07</td>
<td>81</td>
</tr>
<tr>
<td>Nov. 07</td>
<td>67</td>
</tr>
<tr>
<td>Dec. 07</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26</td>
</tr>
</tbody>
</table>
Cassie and her group stood up and presented their game on a *SmartBoard*. The panel then asked them questions about their projects and the students discussed their work further. Cassie took on a leadership role in the group presentation, providing an articulate overview of the group project. In her statements she evidenced a significant transformation from her initial hesitance towards technology expressed at the start of the semester:

*I worked on a lot of the programming which was really new and kind of frightening to me at the beginning. I didn’t know anything about computers at all. I was the worst person in technology in my family and I was a little overwhelmed by this class, but I took a little leap.*

*We were shooting for 2nd grade. I had my brother try it last night and he’s in 5th grade and was like, it’s so easy it’s so easy. I was like, “Christopher it’s for younger kids.” I just wanted him to try it. We all discussed what subjects we thought it should be. I was trying to think about what I wanted to learn when I was younger and what I thought would be interesting.*

*At the beginning it was kind of hard to draw in Flash. I couldn’t even make a house. The further we went in, we did tutorials and we learned so much about it, we came so far. I made the buttons from the questions and I made them go from frame to frame and tried to get them moving fluently. My major part in this was to think of the questions, and make them age-related to the children. I learned so much, the buttons was a huge accomplishment and I’m really proud of myself for learning that. I also learned about time management and working in a group with other people. It taught me so much.*

*Working as a team was difficult. We all had what we thought was right so it was hard putting them all together and incorporating them as one but I thought we did a good job compromising.*

Mrs. Stalnaker made the following comment:

*Cassie was probably the leader of these four to keep them directed. They’re all very talented but she did the directing.*

**Evaluation of Level 50’s Game**

Fitting into both the trivia and role-playing game genres, the Level 50’s game requires players to explore a virtual haunted house, find pathways, make decisions and meet various consequences in the form of quiz questions. Depending on choice of response to a question posed on the screen, the player is presented with a screen feedback (correct or incorrect) with some kind of humorous message and/or graphic related to the response accuracy. The player is given the option to continue on with prompts such as “try another?”*
The Level 50’s game met several of the original objectives — educational, suspense/adventure, role playing — that Cassie had set out in her design document. For example, the Haunted Schoolhouse game has some educational features in the form of a quiz. The choice of a quiz for educational content was made by several of the other RTC groups. Haunted Schoolhouse also provides visual elements that deliver some suspense/adventure, such as the bloody footprints walking down a hall towards a door, and the hat and cup objects on the shelf of a closet, which when clicked take you to the dinosaur screen, or another question. The game provides a “choose-your-own-adventure” path that falls within the role-playing game genre, that the students easily understood would provide a narrative structure for the game and a way to advance the game forward across time.

When we read the Design Document we learned the Haunted Schoolhouse concept was tied to events in the Elkins community, but the game itself and its presentation on the wiki page does not indicate any local connection. It is interesting to note that students’ immediate response to instructions from their teacher to include some educational aspects in the game was to create multiple choice quiz questions. It seems that with further coaching the tie to the Elkins community mentioned in the design document might have led to a representation of this history in some way that would be educational for the player. With increased experience we anticipate use of narratives that leverage multimedia educational opportunities in a more complex way than trivia questions about unrelated U.S. history themes. In this case the students’ definition of educational was quite traditional.

From a project management perspective we note that much of the planned content was not completed. Several of the monster characters and scene graphics created by Cassie and her team were not integrated into their final game project. It appears that the students may have spent time on designing graphics before they were entirely sure how those graphics would be integrated. Or, the students had a plan for the graphics that they were unable to fulfill by the deadline. It appears that the upfront preparatory work was not the most effective planning strategy from a sequencing perspective. Students may have been better off developing the actual game screens and surroundings and environment before designing the graphics. We will integrate observations about sequencing with Pilot-Year-2 curriculum changes.

Cassie’s Post-Program Survey

In addition to Cassie’s final comments in the presentation, she had the following things to say in the Post-Program Survey about her experience with Globaloria:

Question: Has your participation in Globaloria changed anything about the way you spend your free time?

Yes. I enjoy getting onto the computer a lot more than I used to. I also show off our games in my free time to my friends and family.

Question: Tell us about your future goals. Are you already thinking of college and/or a particular job or career?

Yes, I am going to college next year. I am currently indecisive about what career I wish to pursue. I had originally planned to become a dentist. Now, however, I am exploring my options.
Question: Have any of your goals changed since you participated in Globaloria? If so, how?

I have researched my options in the game design industry. I do not believe that I will pursue a career dealing with game design but now I feel that the option has been opened to me.

Further, Cassie stated in the survey:

I feel much more confident when dealing with computers. I also feel that the group work has taught me how to organize my thoughts and how to work well with others. My participation has helped me in other classes. When working in groups, I know how to stay organized and how to get the job done. I really appreciate the opportunity I was given to take this class. I learned so much more than I could have ever imagined. I learned so many new skills with computers and I also learned how to better communicate my ideas to others.

Jacklin and Selena

Jacklin and Selena worked with a male classmate named Cody in a team they called The Demented Trio. Jacklin and Selena were in 10th grade and not as clearly on a trajectory of high achievement as Cassie. Jacklin makes high marks, but presented as quite shy and hesitant to engage with technology in our first site visit. Selena is an important case study for us in that her school performance and achievement in the traditional educational setting has been quite weak; however, she showed significant potential for success in our program.

The Demented Trio worked on a game design project called Sammy the Salmon that shows significant planning and creation of several advanced game design graphics contributed by Jacklin and Selena. The Trio’s game has an educational theme based on a local environmental issue and science topic. Up until recently many rivers in WV were stocked with Coho salmon which is now under consideration by many states for placement on endangered species lists.

In connecting their quiz question content to the subject of their game, they show their understanding that the educational nature of the game should be integrated with the action.

Jacklin (screen name: Gamer15)

Jacklin is a 15-year-old sophomore who had little technology experience prior to her participation in Globaloria. In the Pre-Program Survey question about hobbies, she said she likes to fish, ride four wheelers, and mountain bike. Her previous school achievement and GPA are quite high, at the A level, according to transcripts provided by the school with her parents’ permission. She indicated infrequent technology use, except for digitizing photos and creating PowerPoint presentations. She indicated confidence in surfing, information-seeking, thinking up ideas for games and creating a game, but not in publishing her work and socializing online.
During our initial site visit Jacklin described her previous technology experience and motivation to take Globaloria:

* I want to learn how to use the software. I thought it would be fun. ...I don't really know much about computers. I don't even own a computer with Internet. ... I've had keyboarding. I've never done anything like this before. I'm kind of completely lost!*

Early in the course Jacklin experiments with graphic design, creating a file depicting text about one of her favorite bands, Nickelback. She also completes several of the early tutorials and posts examples on her Project Page.

**Jacklin’s Wiki Activity**

Jacklin was above the class mean for every month except October, when she was slightly below the mean possibly due to the winter school holiday. She spent the first three months of Globaloria making an extensive number of edits, and slowed down somewhat in December, total number of wiki edits of edits. Wiki edits increased again in January, likely in the completion of her final game, and in anticipation of the final game presentations. During the semester Jacklin made a total of 45 uploads to the Wiki, significantly greater than the class mean of 26. For a sophomore who reported being very new to technology — Jacklin’s wiki activity reflects high engagement with the program.

<table>
<thead>
<tr>
<th>Table 8. Jacklin’s Wiki Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>#/Wiki Edits</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Sep. 07</td>
</tr>
<tr>
<td>Oct. 07</td>
</tr>
<tr>
<td>Nov. 07</td>
</tr>
<tr>
<td>Dec. 07</td>
</tr>
<tr>
<td>Jan. 08</td>
</tr>
</tbody>
</table>

Figure 29. Jacklin  
Figure 30. Jacklin’s early graphic design sample
Jacklin’s Profile Page

Jacklin’s Profile page features her likes and dislikes and a photo of a wolf, but no video or other multimedia. Mrs. Stalnaker had suggested that students use the Discussion tab for dialogue. Jacklin takes on a more informal approach, prompting possible visitors with a social question:

*I don't really know what to discuss. What kind of music do you listen to? There's a good question for you to think about. Hurry! Think faster! See, it wasn't that hard was it? I listen to almost anything. I don't like rap that much though.*

Jacklin’s Profile Page has six comments from others, featured in the Discussion tab, features a link to her Project Page and four other external links.

Jacklin’s Project Page

Jacklin’s Project Page features 8 files related to the project assignments required by Mrs. Stalnaker, slightly below the class mean of 9.85. Her Project Page was used primarily to post assignment files and she has no comments from others on this page. Out of 20 students Jacklin had a total of 41 attributes included on these two pages, equal with the class mean.

Mrs. Stalnaker gave Jacklin a grade of “96” on her design document, one of the highest scores in the class. Further results for Jacklin are presented below regarding her team game development. First we will describe teammate, Selena.

Selena (screen name: Heroneeko)

Selena is a 10th-grader who describes her background as follows:

*I lived in West Virginia when I was younger but moved back to Oklahoma. I was raised there and I miss it a lot. There was a lot more diversity and understanding there. I moved back to WV for family reasons and I have been back for about 3 years.*

Selena’s academic transcripts from the previous two school years show a low “C” Grade Point Average, including course failures. According to Mrs. Stalnaker Selena just doesn’t play the game of school. However, in the Pre-Program Survey and introductory session Selena indicated high interest in cartoons, gaming and game design as well as an independent streak:
I’m hoping that the class will introduce me to designing video games because that’s what I want to do. I had a course in web page design. ...I hope to go to a college and major in graphic design/art. I want to someday become the head of a graphic design company in my lifetime. ...I hope to make a game to help people choose what they want to be and not follow what others have to say.

Pre-Program Survey
Selena indicated frequent technology use and gameplay activity as well as confidence in all of the Six CLAs except for thinking up ideas for interactive games, but little actual experience with the activities to be presented in the Globaloria program. In our September 27 site visit, she mentioned she had experimented with a game design software tool other than Flash.\textsuperscript{31}

Selena’s Wiki Activity
Selena’s wiki activity was lower than the class mean in the first two months, but picked up and is slightly higher than the mean in the last three months. Her wiki activity follows the class mean pattern (most substantial in October and November, drop off in December, and an increase again in January.

Selena’s Profile Page
Selena’s Profile Page features her likes and dislikes and two graphics, but no video or other multimedia. Her profile page has nine comments from others. She offers 6 comments to other students in the class. This dialogue occurs on her Discussion tab.

Selena’s Project Page
Selena’s Project Page features 13 assignment files, well above the mean for the class of 9.85. She also posts 18 game elements on this page, including 4 animations she states on the Wiki that she
created on her own. The average number of game elements that students posted on their Project Page was 2.5, which indicates that Selena was much more highly active in posting graphic design files on her page than other students.

Selena had 63 attributes included on these two pages, well over the 41 mean number of attributes per classmate and the second-highest number of attributes of all students in the class. Additionally, Selena contributed a total of 40 uploaded files to the Wiki, compared to the class mean of 26.

In her Game Design Proposal Selena describes the Demented Trio game as follows:

“Sammy the Salmon” is intended for children in the 3rd grade. Questions in the game are aimed at 3rd grade biology. It is an educational action/adventure RPG where you will play the role of a salmon journeying into its spawning grounds. Players will traverse rivers and streams on their way, encountering many adversities such as wild bears and fishermen... The end of this game is unique in that the player dies, just like a real salmon would die after spawning. Allowing players to experience this gives them a new level of understanding for the instincts and nature of salmon.

Selena envisions the game as having educational elements beyond the more traditional multiple choice quiz questions. Selena’s previous experience with gaming and her hobby of fishing may provide her with insight into this more complex level of representation for the game’s educational objective and narrative. For her competitive analysis, Selena notes:

There are many games labeled “Sammy the Salmon” however these are generally racing games or other un-educational games. There were however two games with similar gameplay to ours.

Mrs. Stalnaker gives Selena a grade of 96 on her design document. On the page with her game description she writes, Excellent, and on the cover next to the grade, Really proud of you! Despite this performance and her well-above-average Wiki activity Selena received only a mediocre grade ("C”). When we inquired about this grade, Mrs. Stalnaker explained:

Selena picked and chose what lessons she wanted to do. I gave students credit for doing tutorials and sometimes she chose not to do them so she received a 0. When all grades were averaged she received a C. She is a very talented individual but doesn't like to ‘play’ the school game. If it is work that she likes or feels important to her she will do it. If it doesn't appeal to her, she just doesn't do it. She is not rude or disruptive, she just quietly works on something else.

This explanation is consistent with Selena’s general approach to school and authority as well as her desire for people to choose what they want to be, rather than following what others tell them.
The Demented Trio Team Project

Beginning in late October The Demented Trio started working together and discussing a theme:

“Sammy, the Salmon” will take you on an adventure so you can experience his life cycle. Sammy will swim upstream to spawn. In order for Sammy to be successful in his journey, the player must help Sammy avoid bears, whirlpools, raging rapids, and fishermen by answering questions correctly. The player’s objective allows Sammy to return to the place where he was born.

Demented Trio’s Game Design

The Demented Trio began their game design in late October. The team’s approach was to brainstorm ideas and come to a consensus on the general goal of the game, then divide up the graphic design work and create the many design elements they would need to produce their final game project. Several graphics were not included in the final Sammy the Salmon game. http://www.myglife.org/usa/wv/rtcwiki/index.php/Demented_Trio

The Demented Trio team develops an initial plan for their game and a common understanding of this plan by Jacklin and Selena, the two designers. Team members then create the design elements, which they weave together into a narrative. The Trio posts its proposal on the class Game Proposals page, along with 27 of their files (programmed in Flash) that depict screens and elements that appear in the final game. The Sammy the Salmon game ends with a quiz (the most popular choice). When a functional game was achieved, the Trio created a Team Page and posted files on there (http://www.myglife.org/usa/wv/rtcwiki/index.php/Demented_Trio) as well on the Final Games page for the class.

Evaluation of the Game

The Trio’s game depicts a progression of difficult quiz questions on the Coho salmon, for which they conducted online inquiry and research, layered into a designed environment depicting the salmon heading upstream to spawn. The team’s quiz questions support the game theme and show more connectivity between the narrative and pedagogical goals than the games of other teams. This decision by the students reflects a greater level of complexity than The Level 50’s game for instance, whose quiz content is mostly based on historical facts about the U.S. -- unrelated to the game narrative of a haunted school in their local community that Cassie had discussed at length and set up in their design document.

Sammy the Salmon begins with a starting line and the background of the quiz portrays a progression of scenes in nature, representing the salmon’s journey upstream to spawn.
Adjacent to this image on the Wiki, Jacklin states:

*I created this as an idea for what the person will see first before playing the game. It is like a cover of a game.*

Figure 32. Jacklin’s static graphic elements (not implemented)
I created this as an idea for what the person will see first before playing the game. It is like a cover of a game. (not implemented)

Figure 33. Selena’s animated graphic elements (not in final game)
Sammy the Salmon does not feature animation although several of the earlier graphic images were animated. As in other teams several planned graphics were not utilized in the final game project. When the time came to integrate the ideas of all team members, the students experienced some hurdles in programming the game in ActionScript and bringing their files together into a coherent experience for a player. *The Demented Trio* expresses this frustration on the Wiki, next to their Final Game Project file:
This is no way near what we wanted to do but with a main person of our group was not here the last two days and things got complicated.

In our video of final project presentations, Jacklin says snow days interfered with the team’s game development schedule. Nonetheless, the Demented Trio posted many more game elements than most other teams and their graphic design effort indicates a strong interest and motivation.

**ActionScript Programming, Jacklin and Selena**

For Selena and Jacklin Globaloria led to a greater level of confidence in several areas of technology use. Selena was known as the programmer for her team, however, her absence at the end of the course and failure to complete some of the more complicated proposed features made it difficult to determine Selena’s knowledge of ActionScript. It appeared that at the last minute, in Selena’s absence, Jacklin took on a greater role in coding the game features the team achieved for the final game posted on the Wiki. It is possible that the impending close of the semester and assignment of final grades was a motivating factor for Jacklin in stepping up to help finalize the project in Selena’s absence. They both would have liked more time to advance their learning.

**Final Team Presentation, Jacklin and Selena**

Jacklin, Selena and Cody stood up as a team and presented their game on a SmartBoard. Selena provides an overview of their project.

Many children and people in general don’t understand the hardships that animals go through just to survive. In Sammy the Salmon we were hoping to teach children about some of the hardships they go through just to reproduce, to survive and to live their lives. Right now we’re trying to implement things like jumping animations, the bear’s claw swiping at the water, the fisherman casting his pole in, and we haven’t quite been able to implement those into the game yet, and the sound needs to be put in, but this is what we have so far.

Selena provides some insight into her own approach to game design:

With most of my artwork in the video games – I play video games 24/7 if I can, and I watch cartoons all the time, maybe a bit too much, so that’s more toward my art style – cartooning, humorous, I was trying to make it so that it would be entertaining art styles for kids.

Jacklin, one of the youngest members of the sophomore class, presents the game quite professionally and answers questions with strong articulation about the game design and her participation in the program, in stark contrast to her shy presentation at our first site visit.

When a World Wide Workshop panel member asks the students how they were able to put the game together, Jacklin responded:

ActionScript. It was on a blog site and we just googled it and it was on this Blogger site. I had tried, I knew at least 10 ActionScript codes that I couldn’t get to work and finally I
found it on a Blogger site. Stephanie helped me find it, and I just tried it out and after Mrs. Stalnaker helped me and Toby helped me we finally got it to work and I was like so happy. If you hit the space bar, he will jump – hit spacebar- yup! That was also kind of hard to do I couldn’t quite get it to work right. The dancing salmon was created by Selena, and we are going to put this as the beginning, have the salmon singing and dancing and stuff.

Jacklin then comments about the social meaning of her team’s game and what she learned:

> Basically a lot of people don’t care, and I was researching the other day and apparently, I found out, Coho salmon are actually going extinct because of people’s carelessness in polluting streams and stuff like that.

Jacklin confirms that the team ran out of time to complete their game:

> All the snow days this year took a toll on this class. I was kind of glad we got an extra 5 days built onto the end of the semester. I would have rather been working here than taking a snow day! I don’t know about these two, but yeah. I like Flash, I think it’s kinda fun. I think if I could get it to how I would want it to be, it would take a couple of years.

**Jacklin’s Post-Program Survey**

Jacklin’s Post-Program Survey responses indicate that her confidence in online socializing appears to have increased from pre- to post-program, possibly due to her use of the Wiki to communicate with team members in Globaloria. Further, in her survey responses to our open-ended questions, she indicates the following:

Question: Has your participation in Globaloria changed anything about how you spend your free time? If so, how?

> I sometimes spend time looking for tutorials for Flash and I look at the Wiki.

Question: Tell us about your future goals. Are you already thinking of college and/or a particular job or career?

> I am thinking about working with computers. I might want to design games in the future. Maybe I can work with you.

Question: Do you have plans for a new game design project?

> Yes [game on wildlife conservation]

Question: Please use this space to tell us anything else you would like about your experience in this program.

> It is a great program. To pursue my career I will need Flash but I can't afford it.
On her user Profile page Jacklin discusses her thoughts about the program in further detail:

*I have learned so much about Flash and game making. It is really a lot more difficult than I had expected, but it was well worth the effort. Learning to make things move and change shapes and colors was a lot of fun. I have learned much more than just Flash and game making. I have learned to communicate and work better with others. Writing the game proposal was also helpful in showing me how to communicate well in words so that they have the same effect as saying them.*

**Selena’s Post-Program Survey**

Selena’s Post-Program Survey responses indicate similar positive outcomes. Selena says she now engages in the following activities from home and in school, outside of Game Design class time, which she did not do previously: wiki, Flash, Photoshop, graphic design, thinking up ideas for a game design project and programming. Her confidence in thinking up game design ideas appears to have increased, likely due to her participation in Globaloria. In answering our open-ended Post-Program Survey questions, Selena responds this way:

**Question:** Has your participation in Globaloria changed anything about how you spend your free time? If so, how?

*I now spend a bit more time designing animation or doing artwork in programs like Flash and Photoshop than before.*

**Question:** Tell us about your future goals. Are you already thinking of college and/or a particular job or career?

*I plan on going to college to major in game design. Character design and animation is my main focus but that may change.*

**Question:** Do you have plans to continue your current game design project?

*Yes. Hopefully the game will be finished and fully playable one day. Movement needs to be added along with music and the graphics in it need to be updated a bit.*

**Question:** Do you have plans for a new game design project?

*Yes. I'm planning on using the The Elder Scrolls Construction Set for The Elder Scrolls 4: Oblivion to make some modifications to the game and eventually create a conversion for it. I'll need to use programs like 3DS Max and Blender to do this.*

**Question:** The MyGLife.org Wikis and online resources will remain online for you to use on a continued basis. Will you continue to use these resources?

*Yes. Checking around for tutorials and to see what other students taking this class are designing.*

**Question:** What impact overall do you think your participation in Globaloria has had on you?
*It's shown me how difficult creating a game can be and how much work goes into it.*

Question: Has your participation in Globaloria changed anything about your approach to work in other classes and/or your work on projects outside of school?

*I've learned a lot about using layers in Flash and using ActionScript.*

Question: Please use this space to tell us anything else you would like about your experience in this program.

*I wish that this program would be extended to more advanced programs like 3DS Max and using techniques in Flash like rotoscoping instead of just game creation.*
Kris, Brandon and Toby were seniors. Kris and Toby have learning disabilities so that teachers do not take off points for misspellings. They called their team *The Serial Experimenters* and posted a photo on one of their Profile pages that captures the confidence and bravado of this more experienced team and the way they tackled game assignments and projects.

Kris (screenname: LeonGrex)

When we first visited RTC in September Kris was the first student to stand up and speak. He indicated a high level of previous technology experience and reported having recently skipped school to rent and test out the latest release of *Halo 3*. He said he had significant experience in both gameplay and use of computers. Later in the session he indicates that along with fellow student Brandon, he has participated in Cisco 1 and 2 classes at RTC which involve training on Cisco networking and a limited amount of programming. Two weeks into the class Kris states:

*I’ve helped out [other students] a lot, mostly because me and him [Brandon] figure things out and we try to teach everyone else... What I want to do for the rest of my life really is to make games so it’s better to start early. I’ve taken Cisco 1 and 2.*

In the Pre-Program Survey Kris said he had engaged in all of the activities promoted by Globaloria, except developing an interactive game from beginning to end, putting together a team to make it happen and working in a digital design project team. He indicated high frequency of use for many of the activities, except for several digital activities reflecting CLAs 4 and 5 (such as creating and posting video, photos, music, working in a project team). Kris expressed a high level of confidence and interest in all activities except for game creation.

*I hope to learn how to design a good game and gain proficiency's in the different programs and coding languages needed to do so. I wanted to participate because game design is something I've wanted to do all my Life.*

Kris expresses significant enthusiasm for his participation and the opportunity to design games and says his initial idea for a game includes

*... some kind of RPG probably involving Magic or something to save the world it’s just the kinda guy I am.*

As for his career interests Kris said:
I’m thinking of going to college and having a Major in Game Design and a Minor in International Business.

In response to the open-ended question at the end of the Pre-Program Survey he writes:

I’m a gamer, I test games in my spare time for a lot of MMORPG's and I've spent a lot of time in front of my computer screen, I'd like to think I know what I’m doing but hey I probably don’t. That’s why I’m here to learn more than I do already.

Kris’ Wiki Activity

Kris’s Wiki activity was above the mean in the first month, then drops further and further below as the course progresses. In the first three months he made an extensive number of edits, including setup of Profile and Project Pages, but he slowed down to a great extent in December and January.

<table>
<thead>
<tr>
<th></th>
<th>#/Wiki Edits</th>
<th>Class Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep. 07</td>
<td>61</td>
<td>39.5</td>
</tr>
<tr>
<td>Oct. 07</td>
<td>78</td>
<td>78.4</td>
</tr>
<tr>
<td>Nov. 07</td>
<td>34</td>
<td>45.9</td>
</tr>
<tr>
<td>Dec. 07</td>
<td>6</td>
<td>12.2</td>
</tr>
<tr>
<td>Jan. 08</td>
<td>9</td>
<td>28.7</td>
</tr>
</tbody>
</table>

Kris’ Profile Page

Kris’ Profile page features his likes and dislikes, a photo of himself, 5 graphic images and 4 links: to his blog, his Project Page, his team page and some extra tutorials. His Project Page features 16 assignment files, towards the project assignments required by Mrs. Stalnaker, well above the class mean. Kris posted a total of 18 uploads to the Game Design Wiki, lower than the class mean of 26.

Kris’ Project Page

Kris used his Project Page primarily to post the assignment files. Out of 20 students Kris had 45 attributes included on these two pages overall, slightly higher than the mean of 40.

Brandon (screenname: Mizuman)

During the introductory session Brandon stood up to introduce himself after Kris and began by noting their friendship:

We’ve fooled with the Wiki a lot because it’s pretty cool. I’m doing this because I want to go into computers, but I don’t necessarily want to go into games. I wanted to get a broad sense of everything for when I choose -- because there’s a lot of stuff to learn.

Brandon is an example of a student who sees game design as an opportunity to be exposed to a broader range of technology activities to help him in his goal of working in the software field. He recognizes from the beginning that while game design may not be his specific goal, participating in the activity may be beneficial to his overall knowledge and skills.

Pre-Program Survey

Brandon indicated prior experience designing graphics on a computer, computer programming, and posting creative files to the Internet. His responses on computer use also appear to mirror
those of Kris, indicating high technology use. At the same time, he indicated medium to high levels of confidence and enjoyment for all technology activities and explained his motivation to take the class this way:

_I wanted to get a wider knowledge of everything tech so that I could make sure I can find something I enjoy for a job._

Brandon shared his thoughts regarding interactive games during our September site visit and expressed a relatively complex understanding of a more immersive style of narrative game:

_Real video games are interactive. Something that has a narrative. Like if – you can’t be -- just like, someone’s jumping through a thing and it’s over— it’s something you interact with more on a deeper level. ...  
_I kind of want to do a time traveling point and click adventure were you solve logic or knowledge puzzles to continue on your adventure through different time periods._

Regarding career, he says:

_I'm fairly sure that I want to go into computers probably software engineering and I really want to go to RIT [Rochester Institute of Technology]._

Brandon’s Profile Page

Brandon’s Profile Page features his likes and dislikes, a digital image of himself and a humorous political video. He also presents three game ideas on the Discussion tab, and his profile page has fourteen comments from others, several of whom comment on Discussion tab offering feedback on the ideas he has posted. On the main Profile Page, Brandon features a link to his Project Page and four other links – one to a page of tutorial notes, and three to video game websites he likes.

Brandon’s Project Page

Brandon’s Project Page features 9 assignment files, slightly below the class mean of 9.85. Brandon used his Project Page primarily to post these assignment files and has 4 comments from
others on the Discussion tab. Out of 20 students Brandon had 50 attributes included on these two pages overall, greater than the mean of 41.

**Brandon’s Wiki Activity**

Brandon’s wiki activity was higher than the class mean in all months except December, when it was similar. His record of increases and decreases in frequency is also similar to the class mean, elevating in October, decreasing through December, and increasing again in January. He made 23 total uploads to the Wiki, less than the class mean of 26.

**Toby (screenname: Mostfaithful)**

At first Toby appears to be a somewhat shy student, possibly owing to his dyslexia. He earns good marks in math and Mrs. Stalnaker reported, *Toby has a positive self-image of himself in relation to this particular class*. Regarding his previous technology experience in the school setting, Toby said it was limited to a keyboarding class. On the day of our first site visit, Toby attended class wearing a T-shirt that read, *Things you learn from gaming...* which served as a great ice-breaker for his self-introduction:

*I’m really interested in learning how to use Flash because it has a lot of things you can do with it. It’s just a little hard to start off.*

Toby wanted to create a game with an educational purpose and explained why he chose to take the Game Design class:

*I want to work together with my friends and create a simple Webgame that is interactive and still educational to help people learn. ... I would like to know if the games that we create are actually helping and who it is helping.*

Mrs. Stalnaker observed that Toby’s personality and demeanor helped focus his teammates Kris and Brandon, who were more social, on specific tasks and more detail-oriented work required to actually complete their game project.

In the Pre-Program Survey Toby indicated prior experience in: 1) designing graphics, 2) thinking up an idea for an interactive game, and 3) posting creative files to the Internet, but no experience with any of the other activities we listed. He had a low level of confidence and enjoyment for socializing

### Table 11. Brandon’s Wiki Activity

<table>
<thead>
<tr>
<th></th>
<th>#/Wiki Edits</th>
<th>Class Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep. 07</td>
<td>51</td>
<td>39.5</td>
</tr>
<tr>
<td>Oct. 07</td>
<td>84</td>
<td>78.4</td>
</tr>
<tr>
<td>Nov. 07</td>
<td>35</td>
<td>45.9</td>
</tr>
<tr>
<td>Dec. 07</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>Jan. 08</td>
<td>34</td>
<td>28.7</td>
</tr>
</tbody>
</table>
online using Internet tools, thinking up ideas for interactive games, creating a game from beginning to end, and posting/publishing multimedia files to the Internet. He reports a high level of understanding of software, wikis, *World of Warcraft* and interactive games in general. Toby describes free time this way:

*I often play hacky sac right after school lets out when waiting for the bus. Later me and my friends play a thing called boffering, a form of fighting with safe weapons.*

His career goals are ambitious:

*I want to go to college and get a PHD majoring in Mathematics.*

**Toby’s Wiki Activity**

Toby was close to the class mean in September, but in October clocked 229 wiki edits, the most edits in a single month made by anyone. Most edits were changes to his *Sample Works* page (Project Page) where he stores assignment and game files. Toby also posted at a high rate during November and then drops in his Wiki use, but still remains above the mean in December and January. Toby made a total of 43 uploads to the Wiki, higher than the class mean of 26.

**Toby’s Profile Page**

Toby’s Profile Page features his likes and dislikes and a photo of himself and his team members. He has four comments from others, three of whom comment on the Discussion tab. On the main Profile Page Toby features a link to 4 Project Pages: *Sample Works, Toby’s Tutorials*, some comments on the teachers’ games, and a resource page he created called *Health/Score, Movement, and Walls* along with his blog and Team Page.

**Toby’s Project Page**

Toby’s Project Page features 20 assignment files, higher than the class mean of 9.85. *Health/Score, Movement, and Walls* is a page on which he posts 4 graphics, 3 Project files and 2 Word documents for classmates whom he helps with *ActionScript* coding. During one of our site visits several students refer to Toby as *the class coder*. Toby had 50 attributes (class mean: 41).

**Kris, Brandon and Toby’s Team Game**

*The Serial Experimenters* opted not to show their graded Design Documents to the Globaloria team. Instead, Mrs. Stalnaker shared her evaluations with us. The document was supposed to be a business document submitted to a professional organization. Toby received a “90,” Brandon an “87” and Kris a “68” on the assignment. Mrs. Stalnaker had suggested that Kris ask his English teacher or parents for help but Kris did not comply and the low mark reflects that behavior.

The Serial Experimenters’ proposal was programmed in *Flash* and the team created a wiki to house their design elements. The first screen provides the game overview. It features front/back arrows for the player, indicating the designers had thought about user navigation. See [http://www.myglife.org/usa/wv/rtcwwiki/index.php/The_Serial_Experimenters_Game_Idea%27s_Page](http://www.myglife.org/usa/wv/rtcwwiki/index.php/The_Serial_Experimenters_Game_Idea%27s_Page)
The Serial Experimenters post a game proposal and 9 game elements on the Team Page and the other team members link to this page on their Profile Pages. The team also includes its game proposal on the class Game Proposals page. The Final Game is featured on the class Wiki.

True to their name, the Serial Experimenters tried out different graphic images and effects before compiling their final game file. The team presents the following three options on their game ideas page, initiating an online brainstorming process about game purpose:

1. Lord of the Grades * An adventure game were you solve problems to defeat the evil teacher and his evil workbook minions with a character of your choice

2. Asteroid Drop * A DDR like typing game were you have to match the keys falling from the air or they crush the town below. They have to watch the falling blocks so they won’t be able to look at the keys and will have to remember them

3. Explosives Squad * A minesweeper type game but kinda easier and more interesting like your actually trying to find the bombs to blow them up

The Serial Experimenters’ final choice is the Lord of the Grades theme with the name changed to Infinity Quest. Kris created an animated game scene using a photo of RTC as a background. The students incorporate sprite characters Kris created into their game, making it look as though the action occurred on school grounds. Sprites can be created with several open source software tools and Kris had mentioned in the early introductions he enjoys playing around with sprite characters, so this choice was based on his prior knowledge. Some of the images this group tested prior to creating their final game portray sprites with what is close to a Japanese anime aesthetic.
The initial game genre is *role-playing* with each player choosing a character. The educational focus reflected a quiz with multiple choice math questions.

**Evaluation of Serial Experimenters’ Team Game**

Kris, Brandon and Toby’s game design was more sophisticated than the other teams. We can relate this to the more advanced technology expertise of the team members, all of whom are heavy gamers prior to the course.

In the first screen of *Infinity Quest* the player can choose to be either a boy or a girl. The character serves as an avatar for the user and glows with a green aura when the user answers a question correctly. The quiz questions are all simple math questions targeted towards elementary school students, which may be related to Toby’s career aspiration in getting a Mathematics Ph.D. and becoming a math teacher. The math questions were posed in a very traditional linear way. Capturing a thorough set of screenshots for *Infinity Quest* was difficult as the action and movement was quite fluid and incorporated a significant amount of animation and sound effects.

The Serial Experimenters learned how to create a multiple choice scorecard, which requires a greater level of programming skill than the other teams showed. The game code must specify which choice is correct and keep track of a player’s correct answers. *Infinity Quest* also has interesting effects with several layers moving on the screen simultaneously but taking different paths, creating an overall impression of movement and animation.

**The Serial Experimenters’ Final Team Presentation**

All three of the Serial Experimenters stood up as a team and presented their game on an overhead projector. Brandon provides an overview of their project, as follows.

> **Math is kinda... dry when you’re little, there’s not too many other words for it. You can add, subtract, but that’s just math. So we thought we would try to make math a little more fun for learning multiplication tables for kids. I worked on the grunt work really, getting it all to work. It takes so much time.**

> **Back when we were kids, the games that had this style where they were RPGs and they were all text. There were no scenes and pretty much you had to read lines and lines of text. That was pretty much what they were, for instance Pokemon. I have to say I don’t think I’d be the reader I am today without the video games that required reading when I was a kid. It’s lines and lines of text. It’s reading, that’s what it is.**

Brandon goes on to discuss how he feels that video games should be used for education to a greater extent, and they attempted to make in their math game an entertaining way to learn.

Toby discusses his role on the Serial Experimenters team and how he helped achieve the team’s goal of making the game fun:

> **I’m the programmer basically for the whole class. The programming is really helpful, I learned most of it at my house from two different sets of the 30-day free trials. I love math.**
and I’m going to major in mathematics and try to get a Ph.D. in it. I love it, I don’t know why. ...

I looked on the internet for games to base our game off of, and we realized that all the games we found were horrible. They have these slow counting games or just random questions where there’s no purpose to it. That gets very boring (not for me, but...). I figured we could find a way to come up with a better game, and we all play games – the best way to get us to learn something is to put it into a video game, make it into a narrative, and we’ll learn it even if we didn’t want to.

Kris discusses his role in the game during the Serial Experimenter’s presentation:

I was the art designer, the music designer, the characters, everything you see there, the faces. I was also the voice-acting director. Basically I was inspired by anime, all the Japanese animation and old video games. Really, that was probably the most creative part that I could think of. I’m not very good at drawing or the programming aspects, so I was like, I need to contribute something. I need to contribute something to this whole thing well. So I thought –this is what I can do, so I did it. When I was doing the characters, I was like, I’m going to try to do something that no one else can do. I’m going to get people to do voices for it. So I got a couple of people to audition for it. Clint was our homework monster, Travis was our boy character and Stephanie was our girl character. Our evil teacher was JT.
Opening Screen

Select a character

First math question

Feedback screen with counter scorecard

Animation of several objects simultaneously

Another math question

Last page, Return to Start button

Figure 41. The Serial Experimenters’ final game design (screenshots)
Kris responds to a question about the difference between making and playing games:

*The difference between playing games and making games is that when you’re playing games it’s kind of mindless, you’re pressing the buttons, and you don’t know what’s going on behind the scenes. When you’re making it, you’re going through and playing and you’re also seeing what makes the game work – what’s underlying it. You actually have to think about it and then do it yourself.*

**Kris’ Post-Program Survey**

Kris states he now engages in all of the activities he learned in Globaloria when using a computer at home, except those requiring *Flash* (likely because he does not own this software). In the future he plans to participate in all of the activities regularly on his own, except for programming in *ActionScript*. Kris answers *sometimes true* to questions relating to programming confidence and enjoyment, which appears slightly lower than the confidence and enjoyment he expresses for the other Globaloria CLA abilities. This may be due to his recognition of the intricacies involved in programming work – *the more you learn, the more you learn how much you still have to learn*.

For his future aspirations Kris has expanded his plans for higher education:

*Game Design Major with International business minor and International studies Minor.*

Regarding new ideas for a game, he states,

*Too many to tell here. My mind works to fast for a normal human to understand. I’m being serious.*

As for overall impact of the program, he says:

*It showed me a lot of people don’t understand the gaming industry.*

With his indication of a new interest in international business, and a decreasing emphasis on programming, it appears that as a result of his participation in Globaloria, Kris has recognized the possibility for a more management-level position in the gaming industry. This is an interesting shift from his previously stated career goal to learn hands-on game design.

**Brandon’s Post-Program Survey**

Brandon’s survey responses reflect a lesser degree of confidence in programming. This is an interesting result for a student who had expressed an interest in software development. It may be that his survey response indicates recognition of the need to learn more, now that he has had some actual computer programming experience and understands what this activity entails. His career aspirations remain the same and the project seems to have reinforced his motivation to attend college and get a software-related job.
Brandon reported that outside of school, he now regularly engages in all activities –associated with Globaloria except developing an interactive game and working with a team online to design a project. As for how he spends his free time, Brandon reports:

I would say I spend more time on creative sites and sharing stuff I've done.

Brandon says his team will continue to work on their game and would eventually like to create a new game:

... finishing the story line and adding tweaks to make it more fun ...
...using dragging and dropping as the gameplay.

Regarding Globaloria’s impact on him, Brandon says:

It gave me a lot more options to explore. The sense of accomplishment is awesome.

Toby’s Post-Program Survey

Through Globaloria Toby discovered a talent for programming and he emerged as programmer for the group. In the Post-Program Survey he indicates a higher level of confidence and enjoyment in programming than either Kris or Brandon, who had more prior technology experience. Throughout the semester and in the final student presentations, several students in the class referred to the help Toby had given them.

We had an additional source of data for Toby, which was an anecdote Mrs. Stalnaker recounted in a November phone interview. We had asked Mrs. Stalnaker whether she had any stories to tell from the preceding week. Here is what she told us:

Well, there’s Toby. If you look at his stuff, he is an extremely quiet kid, not really strong in writing, loves math and other stuff though. He is shining right now. He figured out how to put in a button and put it in a slide, and the scorecard. He helps other groups. ... He was just learning the software independently, on his own. He’s played with this at home, and is really taking it very seriously. We’re going to find out how he did [the timer scorecard] on his own. Again, his writing in the proposal document wasn’t that strong, but I thought that his game advancement was above and beyond so I gave him 10 bonus points on his exam. I’m hoping if he’s good at this stuff, maybe he wants to go into some kind of programming, in other coursework and in the future. He’s so quiet, he never says anything, you’d never dream in a million years. The other students really appreciate it. When he goes to help them, you can see it in his face, he’s smiling, very patient. He’s done a wonderful job.
Toby’s self-initiative and also the recognition and personal response by the teacher to some of the students in her class. Most interesting is Toby’s response, “

**It made me learn I don't like knowing more than the teacher.**

This was particularly meaningful because Toby plans to become a teacher himself. He intends to study math and Globaloria may be the starting point for this career.

Toby’s confidence and enjoyment in thinking up ideas and creating interactive games from beginning to end has increased dramatically from pre- to post-program. He now engages in most of the activities promoted by Globaloria in his free time. He is “learning how to use Flash better” and has plans for a new game that would be **a little like Flow.** He will continue to use the MyGLife.org tutorials. He designs graphics and uses social networking sites such as MySpace and Facebook. He is not as interested in blogging, using Photoshop, designing graphics, posting graphics and using social network sites.

**Summary of Case Study Results**

Our goal in developing case studies was to provide an in-depth profile for the type of learning that occurs among students who start the program at different places, chronologically, cognitively and socially. Our group of case study students was diverse in gender, age, technology backgrounds, academic achievement and approach to learning. Despite these significant variations the results were quite positive for all six students.

Although case study teams chose different educational topics, they used a similar quiz-based format of multiple-choice questions to represent what they thought of as educational content. It may have been that the students adopted similar modes of representing for the educational material of their games due to the social nature of the workshop setting Mrs. Stalnaker cultivated or the social nature of the Wiki as an environment to which students published their game files, plans and proposals. In such environments, ideas spread organically and the use of Flash to create a quiz game may have been due to the shared experience.

Quiz topics for The Haunted Schoolhouse and Infinity Quest were unrelated to the action in the games. Sammy the Salmon’s team conducted research on the subject of an endangered variety of salmon and connected the quiz material to the action depicted across several scenes as well as to the overall goal of their game, achieving a more integrated educational approach.

**Cassie** Globaloria enhanced Cassie’s enjoyment and confidence in using technology and gave her an opportunity to recognize her talent for leadership and organizing group work. Without Globaloria Cassie would have left high school with very few technology skills and little experience in project-based work or constructive leadership. The experience expanded her awareness of professional opportunities.

**Jacklin** Jacklin, a sophomore, has been introduced to technology and Constructionist learning at an early phase of her high school career. Jacklin expresses a career interest in game design.
We expect Jacklin’s interest in project-based work to blossom as she continues with the Game Design practicum in the 2008-09 school year.

**Selena** Upon entering the program Selena identified herself as a gamer. She is individualistic in her attitude towards schoolwork and can be said to *march to the beat of her own drum*. Selena’s efforts, particularly wiki activity (highest in the class) and initial design document (which received a high mark) well exceeded most of her classmates but she received a “C” grade in the course because she did not complete several assignments and was absent on the last two days of class when her group was finalizing their game. Selena intends to continue activities that use the skills she learned and demonstrated a continued confidence and interest in a future career in game design.

Selena’s highly independent style is one we suspect may become more frequent as teens engage in their own time with interactive media and become more autonomous in learning outside of school. Students like Selena *get it* (even if their traditional school environment previously has not) – and they latch onto Globaloria and exert effort because they see the connection between our program and significant career opportunities. It is interesting that it is the more traditional aspects of Globaloria as implemented at RTC that Selena rejected. This quality may give tech-savvy teens a level of cynicism about school while independent learning increases their self-confidence.

**Kris** Kris’ participation in Globaloria gave him greater insight into a way to channel his avid gaming interest. Kris entered the course with prior technology experience, gaming knowledge and Cisco 1 and 2 training. Over the semester, Kris appeared to change his tune about technology in comparison to the introductory session when he proclaimed his tech-savvy. Kris’ enthusiasm shifted as he began to realize that his more macro-level understanding of technology might be applied towards *managing* projects. It is interesting that this student experienced difficulty when Globaloria presented him with the opportunity to shift from game *player* to game *maker*. It is possible that his dyslexia prevented him from fully engaging in *ActionScript* programming.

**Brandon** Brandon came to the class with prior experience in technology and gaming as well as Cisco 1 and 2 training. Brandon maintained his career interest in software design but his initial confidence in programming diminished over the semester, possibly due to a greater level of awareness about what it takes to actually learn and succeed in this task.

Brandon’s initial statements about interactive game led him and his teammates to design a more immersive experience for math learners. As avid gamers themselves, these students had a greater awareness of possible game effects they might implement and sought to model some of these effects in their own game, e.g. the team’s complex layering of animations and use of a timer-based scorecard.

**Toby** Toby was a dyslexic student with a strong capability in mathematics. With little previous technology experience and no interest in online networking for social purposes, his achievements were rather dramatic. Toby adopted a great interest, enjoyment and confidence in computer programming, spending significant amounts of time on his own practicing and becoming even more skilled in *ActionScript*. Toby’s new-found skills in programming may be related to his strong prior capability and interest in math. Toby expressed an interest from the beginning of the semester in creating an educational game and his team chose to go with math as the content
domain for the quiz questions. It is possible that Toby’s role-taking could translate into heightened aspirations for a career in education.

Toby’s statement that he learned he didn’t enjoy knowing more than the teacher was an interesting one that may have been connected to his intention to become a math teacher himself. It also supports the findings from our case study of Selena that some students are frustrated with the adult educators, whom they feel are not adequately helping them acquire what they see as the critical technology abilities they will need to move forward.

**Case Study Students in Semester 2 and Pilot Year-2**

In the spring semester Kris, Brandon, Toby and two other male students continued to hone their skills in a special course offered by RTC in conjunction with Marshall Community Technical College. They formed a team called *The Five Experimental Ninjas* and designed a game that will be the subject of a separate in-depth case study paper.  

We have urged Mrs. Stalnaker to recruit Selena to continue with the program in Pilot-Year-2. We are interested in monitoring Selena as one of our longitudinal case study individuals. Globaloria’s emphasis on self-determination may be a good match while acclimating her to group project-based work and web-based interaction.

**Case Study Students after High School**

We learned that Toby had applied and was accepted to a West Virginia University program that provides a five-year combined undergraduate and master’s degree for mathematics teaching. Toby was awarded a Promise Scholarship which will pay his entire tuition in exchange for his promise to become a secondary school mathematics teacher in West Virginia.

Brandon, also a senior, was offered a scholarship to attend West Virginia University in the computer science program. He was also accepted at Rochester Institute of Technology (RIT), his first choice, and was awaiting news on a possible scholarship at RIT.

Kris was accepted at RIT as an international business major, but, in a follow-up interview, Mrs. Stalnaker suggested that he planned to transfer into the Game Design program.
**Future Directions**

_Educator Support, Workshops and Mentorship._ Our dedicated Educator’s Wiki worked well and we will leverage it in the future. Educator workshops held in January enhanced the facility of WV teachers with _Flash_ software and provided opportunities for them to develop communities of practice. Mrs. Stalnaker was a highly active participant, communicating frequently with the Globaloria team, and contributing her own creative and innovative solutions such as an original evaluation rubric for student games and presentations and an adaptation of the design document into a _Flash_ game proposal. She learned _Flash_ and Wiki programming along with her students, and participated in all opportunities for educator professional development. Future research will be conducted to achieve the appropriate balance between expert support and individual exploration.

_Globaloria Syllabus._ Feedback from students and teachers has been highly instrumental in all continued advances we are making to the MyGLife.org platform. We are revising the curriculum to accentuate the invention and progression of a project idea, exploring changes in the syllabus and sequencing of activities in the class to enable integration between a team’s intended design and the final product and to emphasize content, message, and narratives as main drivers of game design. We would like teachers to go beyond the technical support they provide and take a more active role in guiding and mentoring students to employ storytelling features of the game as a way of cultivating more complex educational qualities.

_Performance Evaluation._ RTC game evaluation data serves as a benchmark for comparison with other locations and games created by students in subsequent pilot years. We are developing new evaluation and grading procedures and standards. For students who had experienced previous success in traditional graded performance, graded assignments in Globaloria may have been a motivator that resulted in more effort and higher marks, for others grades may not be a motivational factor. One strategy includes mentoring teachers to use the Wiki log to gain a better sense of individual performance and more accurately evaluate student efforts.

_Students with Different Learning Styles and Abilities._ RTC results suggest that Globaloria has the potential to benefit a wide variety of students. Two students identified as learning disabled participated successfully, and in fact excelled in the program.

Various facets of Globaloria exposed work in students to a wide range of technology, new ways of using the Internet and to create games and simulations and in collaboration with classmates. Competence and enjoyment gained through Globaloria may play a significant role in shaping students future approaches to learning and work as they grow into adulthood. With only one year of Globaloria data, we find that several students have begun to achieve life and work skills directly related to their participation in the program.

**Semester 2 and Pilot Year 2.** Five of the first semester students were able to take _Game Design_ in Semester 2. We implemented several new support mechanisms, including live _Webex_ sessions with expert _Flash_ designers for students and educators, who present customized training modules under development, at suitable points of student progress in the syllabus. Efforts are being made to enable students to continue Globaloria activities on their own time. These strategies include availability of open computer lab time at RTC during and after school, maintenance of the Semester 1 Wiki website and blog for lab and home access, ability to maintain online and in-
person collaboration with the continuing students and developing internship possibilities for students to stay connected and mentor new students.

RTC students who have already taken Globaloria Game Design may elect to take the class again as a practicum, personally advancing while attending class at the same time as new students. This allows students to continue interacting and learning from each other, while giving us the opportunity to follow them across several years. Girls like Selena and Jacklin are strong models for the importance of this program.

**Case Study Students.** We plan to track progress and monitor the choices each of our case study students make as they move forward. We will seek to determine whether continued interest and use of Web 2.0 technology, participation in 6-CLA activities and career choices are linked to their Globaloria experience and, if so, in what way.

**World Wide Workshop Foundation.** We will continue to test the hypothesis that as facility develops in building and maintaining social networks online and expressing oneself through creative multimedia the process becomes second nature. We will explore ways to integrate the Wiki, tutorials, and blog features and empower students to take over the design and navigation of the Wiki to the point where they will intuitively access it in their everyday work.

Research will expand our data base, test the validity of Year 1 findings, and identify significant variables. As we continue our research and quantitative analysis we will refine and expand the variables we are measuring beyond frequency motivation and knowledge. We are currently synthesizing game evaluation data and seeking other improved instruments. Evaluations of student performance and effectiveness of graded assignments will be areas for additional research. We would like to explore Globaloria’s suitability for a diverse range of students, including those with disabilities (LD students) and others with non-traditional learning styles.

We will continue to explore the many facets of wiki activity that are indicative of the peer interaction and social learning that Globaloria facilitates. It reflects the content that participants decide to share with their peers in this virtual platform. When individuals in a team post files online, it allows team members to use the shared ideas to advance individual thinking. Year 1 Wiki activity data will be a benchmark for developing support strategies to increase student wiki use and interaction in the online learning platform, and for comparison in Pilot Year-2.

As we develop our findings regarding implementation and outcome variables, we will also identify the best methods and measures for a larger scale implementation of Globaloria and related impact research. We will expand research capacity through new funding and partnerships with scholars in close proximity to pilot locations. We currently have partnerships underway with researchers at Marshall University, West Virginia University and Fairmount State University. These scholars will bring their own interests and ideas to the table and expand the scope of our research.
**Conclusion**

Young people need an educational system that teaches Web 2.0 technology, encourages collaborative patterns of learning and creating and acknowledges individual talents and learning styles. World Wide Workshop has developed an innovative *constructionist* framework and a complementary curriculum. The Globaloria program promotes six Contemporary Learning Abilities (CLAs) by encouraging students to use digital media as *learning tools* to acquire the skills to compete in today’s technology-enriched, global environment while exploring individual potential and building self-confidence.

Our program brings into the school setting, a non-traditional curriculum which challenges students to create and complete game design projects through independent and collaborative online learning and sharing of ideas. The objective for Globaloria students is to meld original artifacts, rules and themes into a finished, playable, scorable and fun game, with an educational or social message, and post it online for sharing with game players and designers worldwide. In the process students are empowered to teach themselves and each other.

Globaloria was successfully implemented in a state-wide West Virginia pilot project. At the Randolph Technical Center (RTC) in Elkins, WV, Globaloria we introduced a diverse group of self-selected students to the virtual world of game genres, themes and avatars through a 5-day per week, for-credit course, fully integrated into the school curriculum. The RTC experience provides a showcase of how Globaloria works to provide young people with a gateway into real-life 21st-century patterns of communication, interpersonal relations and career paths.

Through analysis of Globaloria RTC Pilot-Year-1 outcomes and case study data we identified successful elements and pitfalls, which serve as guides for further program development and refinement of the CLAs. For example, we are now working on ways to encourage students to engage in a greater extent of research and brainstorming about the social purpose of a game so as to realize the full educational potential of Globaloria.

While our quantitative data was useful and encouraging, the most exciting result was posted on the RTC website: 8 imaginative, fully functional games created by 20 students working in 8 teams. In the comments of our 6 case study students and their teacher’s observations, we found explicit, frequently heart-warming evidence, that the game design course does far more than merely increase digital proficiency. Through team work, wiki postings and editing, online tutorials and networking, these young people explored talents, such as leadership, programming, graphic design and project management, and in the process gained self-confidence and awareness of their own potential to achieve as adults.
## APPENDIX A

Coding Scheme: Aggregate Wiki Edits by User

<table>
<thead>
<tr>
<th>Pilot location</th>
<th>Student Username</th>
<th>Sep-07</th>
<th>Oct-07</th>
<th>Nov-07</th>
<th>Dec-07</th>
<th>Jan-08</th>
<th>Feb-08</th>
<th>Mar-08</th>
<th>Apr-08</th>
<th>May-08</th>
<th>Jun-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTC</td>
<td>Cassie</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jacklin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selena</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kris</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brandon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Toby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Appendix B

Wiki Coding Scheme: Tally Sheet for Attributes Included on Student Profile and Project Pages

### Profile Pages

**Code with quantity 0, 1, 2, etc.**

<table>
<thead>
<tr>
<th>Pilot location</th>
<th>Student Username</th>
<th>Profile Page Avail.?</th>
<th>Likes/Dislikes</th>
<th>Photos</th>
<th>Videos</th>
<th>Other Multimedia</th>
<th>(What other multimedia)</th>
<th>Comments from Others</th>
<th>Comments to Others</th>
<th>Link to Project Page</th>
<th>Other links</th>
<th>Game files</th>
<th>Game Idea</th>
<th>Assignment files</th>
<th>Other</th>
<th>(What?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTC</td>
<td>Cassie</td>
<td>1=YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jacklin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Project Pages

**Code with quantity 0, 1, 2, etc.**

<table>
<thead>
<tr>
<th>Project Page Avail.?</th>
<th>Assignment files</th>
<th>Game proposal in Flash</th>
<th>Game proposal / design doc in text</th>
<th>Game asset files</th>
<th>Final Game .SWF</th>
<th>Final Game .FLA</th>
<th>Descriptive text about Final game files</th>
<th>Comments from others</th>
<th>Comments to others</th>
<th>Other</th>
<th>What?</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=YES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX C

### Coding Scheme: Webgame Evaluation, Globaloria Program (DEVELOPMENT IN PROGRESS)

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>CRITERIA</th>
<th>Notes:</th>
<th>Date:</th>
<th>0 = No; 1= Yes; DK = Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Designer Name(s):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reviewer(s):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Game Concept</strong></td>
<td>Did the students post a design document (Word Document) to the Wiki, outlining the PLAN for the game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Was the pre-planning and design document complete?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Did the students create a Paper Prototype?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Was the Paper Prototype complete?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Did the students create a game proposal in <em>Flash</em>?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the game objective clear from the final implementation of the game and your play of it?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How many genres does the game reflect? (e.g., Quiz, Interactive Adventure [With Game characters, etc.], Side-Scrolling but no active gameplay, Linear Decision Tree [Slide Presentation], Informational Presentation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the game present an educational topic or social issue that is appropriate for the target audience?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the game subject present a cultural theme related to the locality of the designers?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does it appear that students did research into the content and material presented in the game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Was the game free of errors about the educational theme presented?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does it appear that the designers learned something NEW about the content of the game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does it appear that the player will learn something NEW in playing the game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Will the game advance the students' <em>substantive</em> knowledge, to the extent that it could be used in a classroom?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do the dynamics of the game feel immersive?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the Final Game include a narrative / storyline / dramatic arc that fits with its educational goal? (e.g., beginning, middle, end)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Is the game narrative cohesive / logical?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the purpose of the game carry throughout the gameplay?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the game provide a context for the gameplay, either as a <em>Flash</em> introduction that is part of the game, or on the Wiki surrounding the <em>Flash</em> file?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the game feature denouement / resolution / closure / post mortem?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the game's construction appear complete? [I.e., no unfinished portions in the game implementation]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Did the final game meet the original goals stated in the design document? (0 if no design doc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Did the final game meet the original goals stated in the paper prototype? (0 if no design doc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Design/User Interface</strong></td>
<td>Are there instructions / Help button on how to manipulate and play the game?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a general consistency to the interface design throughout the game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In all instances, are buttons and controls grouped together and in a consistent location as navigational tools of the game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In all instances, is it clear that the buttons are an interactive piece of the screen?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do any buttons have a rollover change?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When a player clicks a button is it obvious that something has changed on the screen?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Artwork**

- Does the game design include any original graphic design artwork for characters?
- Does the game include any imported graphic design elements?
- Does the game include original video clips?
- Does the game include imported video clips?
- Do any of the graphic design elements include references to pop culture?
- Does the game design include original artwork for background/environment?
- Does the game offer proper attribution and credit for borrowed or purchased artwork?
- Does the game reflect motion across space?
- Are there any animated/Flashing images in the background?
- Are the images of clear quality? (No blurriness or 'fringing' around the graphics, stretching, blurring, outlines)

**Interactivity and Gameplay:**

- Does the game offer feedback to the user based on their decisions and actions? (e.g., quiz game provides feedback on correct/incorrect response; in a side-scrolling game with a Character on a Quest, when a character dies the screen provides a message)
- Is there a main character or object in the game (e.g., spaceship)?
- Does the main character object move when using the keyboard and/or Mouse to control?
- Are there other Non Player Characters? (NPCs)
- Are the NPCs moving?
- Does the character include frame animation? (e.g., walking with moving limbs)
- If moving, do the main characters encounter NPCs that are obstacles?
- Do the main character objects detect collisions? (e.g., does colliding with an NPC kill the character?)
- Did collisions (object interactions) register within the game as you would expect them? [I.e., no "missed" shots; objects bump each other and behave appropriately]
- Are the NPCs programmed to have some awareness of the state of the game in play, and alter their behavior as result? (e.g., the NPC changes trajectory based on colliding with the character; the NPC speeds up or slows based on health or score of the main character)
- Does the game feature a Timer?
- Is the purpose of the Timer in the game narrative clear?
- Does the game feature a Score?
- Is the purpose of the Score in the game narrative clear?
- Does the game feature Health?
- Is the purpose of the Health in the game narrative clear?
- Does the game feature different Levels?
<table>
<thead>
<tr>
<th>Is the purpose of the Levels in the game narrative clear?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do the Levels enhance the dramatic impact?</td>
<td></td>
</tr>
<tr>
<td>Is there clear indication that the game is progressing, such as indication of what level you are, and how many levels exist?</td>
<td></td>
</tr>
<tr>
<td>Does the game feature escalation, such as higher scoring at higher levels?</td>
<td></td>
</tr>
<tr>
<td><strong>Functionality</strong></td>
<td><strong>WHAT bugs did you find?</strong> (bugs include things like Mute button that mutes but doesn't un-mute; when character dies, the game puts you back at very start, instead of the current level game; broken button link)</td>
</tr>
<tr>
<td><strong>Sound Design</strong></td>
<td>Does the game feature background music?</td>
</tr>
<tr>
<td></td>
<td>Is the background music original?</td>
</tr>
<tr>
<td></td>
<td>Does the game feature more than 1 background music file, for instance at different levels?</td>
</tr>
<tr>
<td></td>
<td>Does the game feature sound effects based on game events?</td>
</tr>
<tr>
<td></td>
<td>Are sound effects original?</td>
</tr>
<tr>
<td></td>
<td>Does the Flash file provide proper credit for borrowed Sound files?</td>
</tr>
<tr>
<td><strong>Game and Presentation File</strong></td>
<td>Did the students post specific game assets from their game to the Wiki while the work was in progress?</td>
</tr>
<tr>
<td></td>
<td>Did the students post final .SWF file to the Wiki?</td>
</tr>
<tr>
<td></td>
<td>Did the students post final .FLA file to the Wiki?</td>
</tr>
<tr>
<td></td>
<td>Did the students post their final presentation PPT file to the Wiki?</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FOR TEAM GAMES</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Collaboration and planning</strong></td>
<td>Are team members' roles apparent in game credits in Flash?</td>
</tr>
<tr>
<td></td>
<td>Are team members' roles apparent on the Wiki?</td>
</tr>
<tr>
<td></td>
<td>Did the students use the wiki to track the overall game project schedule?</td>
</tr>
<tr>
<td></td>
<td>Did the students use the Wiki for final game file management?</td>
</tr>
<tr>
<td></td>
<td>Did the students use the Wiki to communicate about game design process together?</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FOR INDIVIDUAL GAMES</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Project management</strong></td>
<td>Does the game indicate designer Credits in Flash?</td>
</tr>
<tr>
<td></td>
<td>Does the game indicate designer Credits in the Wiki?</td>
</tr>
<tr>
<td></td>
<td>Did the student use the wiki to track the overall game project schedule?</td>
</tr>
<tr>
<td></td>
<td>Did the student use the Wiki for final game file management?</td>
</tr>
<tr>
<td></td>
<td>Did the students use the Wiki to communicate in text about game design process with other individuals?</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX D

**Survey Variable Composites: CLAs**

**CLA 6**  
**Survey Items for FREQUENCY**  
CLA 6. Surfing websites and web applications  
How often do you…  
7-point scale: 1=Never, 2=less often but sometimes, 3=a few times a month, 4=about once/week, 5=a few times/week, 6=about once/day, 7=several times/day

<table>
<thead>
<tr>
<th>Activities (2 Sub-Factors)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-Factor 1: Surfing online</strong></td>
<td></td>
</tr>
<tr>
<td>Surf online for fun</td>
<td>surffonlinefreq / postsurfonlinefreq</td>
</tr>
<tr>
<td>Shop online</td>
<td>shoponlinefreq / postshoponlinefreq</td>
</tr>
<tr>
<td>Listen to music online</td>
<td>listenmusiconlinefreq / postlistenmusiconlinefreq</td>
</tr>
<tr>
<td>Watch video online</td>
<td>videoonlinefreq / postvideoonlinefreq</td>
</tr>
<tr>
<td><strong>Sub-Factor 2: Gaming</strong></td>
<td></td>
</tr>
<tr>
<td>Play internet games</td>
<td>internetgamesfreq / postinternetgamesfreq</td>
</tr>
<tr>
<td>Play software games on a computer</td>
<td>softwaregamesfreq / postsoftwaregamesfreq</td>
</tr>
</tbody>
</table>

**Survey Items for MOTIVATION**  
CLA 6. Surfing websites and web applications  
How true are the following statements for you, personally?  
5-point scale: 1=Not at all true, 2=Not usually true, 3=Sometimes true, 4=Usually true, 5=Very true

<table>
<thead>
<tr>
<th>Activities (2 Sub-Factors)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sub-Factor 1: Surfing online</strong></td>
<td></td>
</tr>
<tr>
<td>I am confident in my ability to surf online for fun.</td>
<td>surfconf / postconfsurf</td>
</tr>
<tr>
<td>I enjoy surfing online for fun.</td>
<td>surffenjoy / postenjoy surf</td>
</tr>
<tr>
<td>I value surfing online for fun.</td>
<td>surfvalue / postsurfvalue</td>
</tr>
<tr>
<td><strong>Sub-Factor 2: Gaming</strong></td>
<td></td>
</tr>
<tr>
<td>I am confident in my ability to play internet games.</td>
<td>intgameconf / postconfintgames</td>
</tr>
<tr>
<td>I enjoy playing internet games.</td>
<td>intgameenjoy / postenjoy intgames</td>
</tr>
<tr>
<td>I value playing internet games.</td>
<td>surfvalue / postsurfvalue</td>
</tr>
</tbody>
</table>
### CLA 5

**Survey Items for FREQUENCY**

CLA 5. Information-based learning, purposeful search and exploration

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a search engine</td>
<td>searchenginefreq / postsearchenginefreq</td>
</tr>
<tr>
<td>Using Wikipedia</td>
<td>wikipediafreq / postwikipediafreq</td>
</tr>
<tr>
<td>Finding online resources to solve a specific problem</td>
<td>infoseekfreq / postinfoseekglobprojfreq</td>
</tr>
</tbody>
</table>

**Survey Items for MOTIVATION**

CLA 5. Information-based learning, purposeful search and exploration

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in searching for and using online resources</td>
<td>infoseekonlineconf / postconfinfoinqiry</td>
</tr>
<tr>
<td>Enjoyment of searching for and using online resources</td>
<td>infoseekonlineenjoy / postenjinfoinquiry</td>
</tr>
<tr>
<td>Value for searching for an using online resources</td>
<td>infoseekonlinevalue / postinfoseekonlineval</td>
</tr>
</tbody>
</table>

### CLA 4

**Survey Items for FREQUENCY**

CLA 4. Social-based learning, participation and exchange in a networked environment

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using email</td>
<td>emailfreq / postemailfreq</td>
</tr>
<tr>
<td>Sending instant messages</td>
<td>imchatfreq / postimchatfreq</td>
</tr>
<tr>
<td>Using online social networking sites like Facebook and MySpace</td>
<td>socnetfreq / postsocnetfreq</td>
</tr>
</tbody>
</table>

**Survey Items for MOTIVATION**

CLA 4. Social-based learning, participation and exchange in a networked environment

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in socializing online</td>
<td>onlinesocconf / postconfsoconline</td>
</tr>
<tr>
<td>Enjoyment of socializing online</td>
<td>onlinesocenj / postenjsoconline</td>
</tr>
<tr>
<td>Value for socializing online</td>
<td>onlinesocvalue / postvaluesoconline</td>
</tr>
</tbody>
</table>
### CLA 3

**Survey Items for FREQUENCY**

**CLA 3. Publishing and effective distribution of digital media**

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posting to a blog</td>
<td>blogpostfreq / postblogpostfreq</td>
</tr>
<tr>
<td>Posting to an online social network</td>
<td>socnetpostfreq / postsocnetpostfreq</td>
</tr>
<tr>
<td>Posting to a Wiki</td>
<td>wikipostfreq / postwikipostfreq</td>
</tr>
<tr>
<td>Posting photos online</td>
<td>photopostfreq / postphotopostfreq</td>
</tr>
<tr>
<td>Posting digital video online</td>
<td>digividpostfreq / postdigividpostfreq</td>
</tr>
<tr>
<td>Posting graphics and animations online</td>
<td>graphicspostfreq / postgraphicsanipostfreq</td>
</tr>
</tbody>
</table>

**Survey Items for MOTIVATION**

**CLA 3. Publishing and effective distribution of digital media**

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in publishing multimedia files online</td>
<td>publishmultimediaconf / postconfpublishwiki</td>
</tr>
<tr>
<td>Enjoyment of publishing multimedia files online</td>
<td>publishmultimediaenj / postenjpublishwiki</td>
</tr>
<tr>
<td>Value for publishing multimedia files online</td>
<td>publishmultimediaval / postvaluepublishwiki</td>
</tr>
</tbody>
</table>

### CLA 2

**Survey Items for FREQUENCY**

**CLA 2. Project-based learning and online project management in a wiki-based networked environment**

<table>
<thead>
<tr>
<th>Activities (2 Sub-Factors)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Creating digital media</strong></td>
<td></td>
</tr>
<tr>
<td>Remixing digital music</td>
<td>remixmusicfreq / postremixmusicfreq</td>
</tr>
<tr>
<td>Digitizing video on a computer</td>
<td>digivideofreq / postdigivideoeditfreq</td>
</tr>
<tr>
<td>Programming</td>
<td>programfreq / postcompprogfreq</td>
</tr>
<tr>
<td>Creating multimedia files</td>
<td>createmultimediafreq / postcreatemultimediafreq</td>
</tr>
<tr>
<td><strong>Factor 2: Collaborating with team members</strong></td>
<td></td>
</tr>
<tr>
<td>Collaborate with team members online</td>
<td>onlineteamcollabfreq</td>
</tr>
<tr>
<td>Collaborate with team members FTF</td>
<td>ftfteamcollabfreq/ postftfteamcollabfreq</td>
</tr>
</tbody>
</table>
**Survey Items for MOTIVATION**

**CLA 2. Project-based learning and online project management in a wiki-based networked environment**

<table>
<thead>
<tr>
<th>Activities (2 Sub-Factors)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Creating with digital media</strong></td>
<td></td>
</tr>
<tr>
<td>Confidence in creating an interactive game from beginning to end</td>
<td>gamecreateconf / postconfcreatintgame</td>
</tr>
<tr>
<td>Enjoyment in creating an interactive game from beginning to end</td>
<td>gamecreateenj / postenjcreateintgame</td>
</tr>
<tr>
<td>Confidence in computer programming ability</td>
<td>compprogconf / postconfcompprog</td>
</tr>
<tr>
<td>Enjoyment of computer programming</td>
<td>compprogjen / postenjcompprog</td>
</tr>
<tr>
<td><strong>Factor 2: Collaboration with project team members</strong></td>
<td></td>
</tr>
<tr>
<td>Confidence in using a Wiki to manage teamwork</td>
<td>wikiteamconf / postconfwikiteamwork</td>
</tr>
<tr>
<td>Enjoyment of using a Wiki to manage teamwork</td>
<td>wikiteamenj / postenjwikiteamwork</td>
</tr>
<tr>
<td>Value for using a Wiki to manage teamwork</td>
<td>wikiteamvalue / postvaluewikiteamwork</td>
</tr>
</tbody>
</table>

**CLA 1**

**Survey Items for FREQUENCY**

**CLA 1. Invention, progression, and completion of an original digital project idea (for an educational game or simulation)**

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having creative ideas for a digital project</td>
<td>creativeprojideafreq, postcreativeideascomppfreq</td>
</tr>
<tr>
<td>Having creative ideas for a digital game</td>
<td>gameideafreq, postgameideasfreq</td>
</tr>
</tbody>
</table>
### Survey Items for *MOTIVATION*

#### CLA 1. Invention, progression, and completion of an original digital project idea (for an educational game or simulation)

<table>
<thead>
<tr>
<th>Activities (1 Factor)</th>
<th>SPSS variable names, pre- and post-survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in thinking up game ideas</td>
<td>gameideasconf / postconfgameideas,</td>
</tr>
<tr>
<td>Enjoyment of thinking up game ideas</td>
<td>gameideasenj / postenjgameideas</td>
</tr>
<tr>
<td>Value for thinking up game ideas</td>
<td>publishmultimediaenj / postenjpublishwiki</td>
</tr>
</tbody>
</table>
APPENDIX E

Changes in RTC Students’ 6 Contemporary Learning Abilities, from Pre to Post-Program:

FREQUENCY

1. 7-Point Scale
   * p<.05
   *** p<.001
See Table 2 for examples of activities representing the 6-CLAs
Changes in RTC Students’ 6 Contemporary Learning Abilities, from Pre to Post-Program:

**MOTIVATION**

1. 5-Point Scale

*See Table 2 for examples of activities representing the 6-CLAs
The 21st Century Learning Standards and Skills, promulgated by the American Association of School Librarians (AASL) and applied in most public school-media programs have not kept pace with the speed of digital innovations.


The Claude Worthington Benedum Foundation is a regional philanthropy serving West Virginia and southern Pennsylvania.


See Reynolds, Rebecca and Harel Caperton, I. The GLOBALORIA Program as a Model for 21st Century Learning, World Wide Workshop Innovation Report # 1. (In progress)

In the action-based methodology researchers identify how to improve the way they address issues and solve problems. Design-based research, an emerging paradigm, focuses on identification of relationships among educators, environment, curricular/technological Innovation and outcomes.


For example, our MyGLife.org pilot projects in Israel, at American University School of Journalism and Mass Communications focusing on game design related to social and educational themes, and in our MySLife.org pilot projects with Schlumberger-SEED focusing on participant creation of games and simulations specifically addressing the global climate crisis.

See World Wide Workshop’s Innovation Report #1, The GLOBALORIA Program-- Empowering youth worldwide to collaborate and experience democracy and globalization with web 2.0 tools (in progress).

See World Wide Workshop Foundation Innovation Report #1. (In progress) for a description of Professional Skills and Life Skills that facilitate participation in the knowledge economy along with Contemporary Learning Abilities.


See [www.pewinternet.org](http://www.pewinternet.org)

Hargittai, E. Survey measures of web-oriented digital literacy. *Social Science Computer Review*, 23(3): 371-379 (2005). Hargittai offers a validated set of survey items for the concept of “digital literacy” as she defines it that can stand in as a proxy for peoples’ actual technology skills in survey research. She operationalizes the “perceived knowledge” proxy survey instrument as follows: "How familiar are you with the following Internet-related items? Please choose a number between 1 and 5 where 1 represents having ‘no understanding’ and 5 represents having ‘a full understanding’ of the item. (none, little, some, good, fully)." Among a random sample of U.S. adults Hargittai’s composite optimal index of internet-related items achieved a Cronbach’s alpha of .89, with a predictive power (adjusted $R^2$) of .321 for actual internet competence, measured by a knowledge test of digital task completion -- the highest among all quantitative indices of digital literacy published. This finding indicates that other researchers who use Hargittai’s survey measures in a different survey of adults’ technology knowledge, can expect that this new survey will be predictive of their subjects’ actual knowledge at a level of 32% (a predictability quite high for survey methods).


See WV Department of Education website, [http://careertech.k12.wv.us/](http://careertech.k12.wv.us/).

Initially 20 students enrolled at RTC, but one student moved out of state.

Further details on the GLOBALORIA-WV statistical methodology is provided in Reynolds and Harel Caperton *Innovation Report # 8*

Frequency is a standard variable within new media research that indicates media adoption and diffusion within and across populations. It is a variable common to almost all media research.

Composite reflected a Cronbach’s alpha reliability statistic of over $\alpha=.9$.

Creative Commons license from WikiMedia to World Wide Workshop Foundation

Data on file uploads per student *per month* is a metric that our Wiki statistics tool does not make available at this time, but this will be available in Pilot Year-2.

We refer to case study students by pseudonyms to protect their privacy.

The name is related to the levels included in video games; the player who makes it to Level 50 is very skillful.

Selena refers to using a game design software tool, packaged with corporate games, such as those produced by Electronic Arts, that enables players to customize game elements and environments.

*ActionScript* is the programming language utilized in Flash software design
SmartBoard is an interactive white board similar to a very large touch-screen of a tablet computer.

The Elder Scrolls is a Sony Playstation 3 console game.

3DS Max software is a comprehensive 3D modeling, animation, and rendering solution used by leaders in the game development

Blender is an open source, cross platform suite of tools for 3D creation.

Halo 3 is the third title in the Halo series of video games by Bungle, and is a first-person shooter game developed for the Xbox 360, launched in the US in September 2007.

Cisco 1 and 2 courses that Kris refers to are two levels of training offered by Cisco Systems worldwide in IT and networking, entitled generally as IT Essentials.

Role-playing game

World of Warcraft is a popular networked massively multiplayer online role-playing game (MMORPG) released by Blizzard.

A sprite refers to a partially transparent two-dimensional animation that is mapped onto a special plane in a 3D scene to create an illusion; viewers do not notice that it is flat and always faces them.

Role playing games

Pokemon is a Nintendo franchise of hobby collection and gameplay that began with simple card collection and has advanced into the interactive gaming market.

MySpace and Facebook are popular online social network services. Photoshop is an Adobe graphic design software product. flOw is a Sony Playstation 3 game about piloting an aquatic organism through a surreal biosphere where players consume other organisms and evolve.

See World Wide Workshop’s The Case of the 5 Experimental Ninjas: RTC Students’ Continued Development in the Context of an Experimental and Virtual College-Level ‘Game Design II’ Course in PY-1, Semester 2 (in progress).

West Virginia PROMISE (Providing Real Opportunities for Maximizing In-State Student Excellence) is a merit-based scholarship providing West Virginia high school graduates meeting certain requirements, a full tuition scholarship to a state college or university in West Virginia or an equivalent amount to an in-state private college.

Rochester Institute of Technology (RIT) is located in Rochester, NY.