

# **A Research Framework to Examine Educator Experiences in Globaloria from Pilot Year 1: Preliminary Findings and Future Directions**

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# 1. Introduction

The purpose of this paper is to describe and explain the vision, goals, and research agenda that emerged during the Globaloria Pilot Year One (PY-1) in West Virginia, through the lens of teacher professional development (TPD). Globaloria uses open source social media and Web 2.0 technology to encourage teachers and students to engage in “learning by design” projects that can be integrated into any curriculum (Caperton, 2009). Learning by design has a rich body of evidence of its effectiveness in deepening learner engagement, understanding and knowledge across the curriculum (Harel, 1991). While educators were carefully trained and supported (and also received stipends for their participation), TPD research was not a central focus of the Globaloria research agenda. However, it emerged as an important part for understanding how and to what extent educators benefited from their participation. We therefore delineate our process of developing a theory- and research-based teacher professional development model framed by two overarching research questions:

- *What types of 21<sup>st</sup>-century learning programs and related teacher professional development are necessary to respond to the shifting priorities of K12 curricula?*
- *What insights does the Globaloria TPD provide regarding this?*

We situate Globaloria TPD in existing TPD theory and practice frameworks, and then provide a new framework, coupled with preliminary findings about the educator experience in Globaloria-WV PY-1. Our analyses point the way for future growth for this statewide 21<sup>st</sup>-century learning and teaching innovation. The recommendations section illustrates the research areas that we intend to explore in order to contribute to the growth of TPD research in Globaloria, and in the field of teacher education innovation in general.

## 1.1 Background

Teaching professionals, academics and researchers are re-examining our priorities in response to the changing purposes of education as our global society manages the complex transitions from the Industrial Era to the Information Age (Web 1.0) to the Social Media Technology Age (Web 2.0). What teachers need to know and be able to do in 21<sup>st</sup> century school systems is driving new research on how teachers learn and develop their practice. Not too long ago, the purpose of public schools was to help students learn reading, writing and arithmetic—it was not typical practice to teach higher order problem-solving or critical thinking in public schools, and the need for digital literacies did not exist (Wayne, Yoon, Zhu, Cronen, & Garet, 2008). Today, our global workplace and the new Knowledge Economy (Malone, 2004) demand new skills, which require the shifting of priorities within the K12 curricula (Dede, 2000). Today’s students must learn to think critically, problem solve, work across time zones, cultures, and various communication systems. We must develop K12 curricula that develops basic skills and uses them as “a substrate for mastering complex mental performances” that are valuable in the workplace and for an informed global citizenry (Dede, 2008). However, rethinking curricula is not enough, we must also rethink how people learn most effectively in the Social Media Technology Age. For example, Senge, Brown and Rheingold wrote that as we move away from the “knowledge container delivery method to a more active inquiry method” for learning then we must also think of learning in terms of “*perpetuum addisco*” or “never-ending learning” (Senge, Brown, &

Rheingold, 2008, pp. 126-127). The authors celebrate this shift as a return to fostering curiosity and creativity among students, a central feature of inquiry-based learning that is a key element of the 21<sup>st</sup> century learning frameworks now adopted by many states in the US to frame curriculum reform efforts<sup>1</sup>. Further, Brown and Adler argued that we must attend to social learning (understanding of content is socially constructed through conversation and group activities about content) as a new model for learning rather than the traditional Cartesian view of transferring knowledge from teacher to student. They argue that just as we have moved to Web 2.0, we must move to Learning 2.0, a demand-pull rather than supply/push teaching and learning model. They wrote that demand-pull learning modes blur the lines between formal and informal education, and engages students in ongoing “flows of action” that are based on real world events that support passion-based learning (Brown & Adler, 2008). Whether one see these calls for reform as a daunting task or breath-taking opportunity, as researchers and designers of TPD we must respond to our changing world and changing focus of education.

Today’s teachers must be up to the task of teaching these skills and concepts. Darling-Hammond and Bransford argue that teachers must be adaptive experts who continually grow and develop knowledge and skills, rather than work to acquire a core set of skills to be used for an entire career (Darling-Hammond & Bransford, 2005). These ideas of lifelong learning and reflective practice are deeply embedded in the theoretical underpinnings of Globaloria, particularly when viewed through the lens of Constructionism and emerging theories of learning and design. In 1996 Kafia and Resnick wrote, “In constructionist learning, forming new relationships with knowledge is as important as forming new representations of knowledge” (Kafai & Resnick, 1996, p. 2). The use (and misuse) of computers and digital media in public schools has highlighted the importance of these core concepts even further, particularly in light of teacher learning and professional development.

Today’s children are growing up in a new ecology where the real and the virtual become seamless, where text messaging and creating online content or doing homework while communicating with friends over the cell phone, instant messaging and watching television is commonplace. There is an emerging new ecology in schools as well, although it is not as easily recognized. Cuban and other scholars have argued that in many cases one can choose a public school classroom and it will look much as it has since the early 20<sup>th</sup> century (Cuban, 2001). However, there are important changes in teaching and learning in most K12 classrooms that are not easily discernible from the door of the classroom. Computers and the Internet have been significant change agents in public school classrooms for over two decades now, but the nature and extent of these changes are not easily visible to the world outside the classroom, or as well understood. Zucker argued that the pace of change has been so fast that most people do not realize the impact of the proliferation of online high schools, social networking, or the impact of the ubiquitous graphing calculator on improving student math scores (Zucker, 2008). In recent years, we have seen a shift from Web 1.0 that opened doors to new worlds of information and content created for our consumption, to Web 2.0, where we mash up<sup>2</sup> and remix<sup>3</sup> digital media to suit our purposes, build and maintain relationships through social networking, and create our

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<sup>1</sup> See <http://www.21stcenturyskills.org/> for information on the partnership.

<sup>2</sup> See iGoogle, for example. Mash ups are program applets that users may take and put together on a web page.

<sup>3</sup> Remixing, in this context is taking a story or song and remixing the pieces of text or music to make something new. See <http://www.folger.edu/template.cfm?cid=2614> for an example of school children remixing Shakespeare.

own products as we “Skype™” and “friend” people on FaceBook (Solomon & Schrum, 2007). Changing patterns in Internet usage, new understandings about how teachers and students learn, and shifting priorities about what is important to teach and learn raise this focused version of our original research question:

*What types of 21<sup>st</sup> century teacher professional development are necessary to support the changing needs of teachers as they respond to the shifting priorities of K12 curricula?*

We believe the Globaloria Program provides some important answers to this question, and is a rich source of data for research that will help extend our knowledge of how to build new models for effective 21<sup>st</sup> century teacher professional development.<sup>4</sup> This report focuses on the modes of professional development provided for educator participants in the Globaloria-West Virginia project Pilot Year-1 (PY-1). As we have become immersed in Project Year 2 (PY-2), the lessons we learned in PY-1 have taken on richer meaning, and the findings of our research have led to empirical analysis and examination of practical experiences. We propose that through self-learning (learning by doing), peer learning (learning with other educators) and co-learning experiences (learning with experts) in Globaloria with their students, educators become better prepared to lead learners in rich and beneficial project-based learning experiences with technology, and better prepared to creatively use digital media as tools more widely in their ongoing practice. The next section is an overview of the purposes and goals of the Globaloria PY-1 in West Virginia, and set the context for the theoretical frameworks that informed our program design and our research on the educator<sup>5</sup> experience and professional development.

## ***1.2 Overview of the Globaloria Program***

Globaloria focuses specifically on developing educational programs *for both students and educators* to engage in social and collaborative game design and construction using open source Web 2.0 platforms, to gain proficiency in the higher order skills and concepts needed for 21<sup>st</sup> century citizens. Globaloria empowers educators and students in economically and technologically underserved communities to learn and create complex content such as games and simulations and to experience leadership, democracy and globalization through engagement with Web 2.0 and social media technology and game design and production.

Globaloria prepares educators and students to:

- Learn within open source communities on a Wiki (read/write, pull/push, surf/post, receive/contribute).
- Design and produce educational, socially-conscious interactive games and simulations.

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<sup>4</sup> It is important to note that our core focus was on creating learning environments for students, and we are retrospectively examining the teacher experience. In our Year Two report, and in other research venues, we will focus fully on TPD as well as student impacts.

<sup>5</sup> We use the terms educator and teacher in this report, and the two are almost interchangeable. We tend to use educator to indicate teachers, staff and administrators. We use the word ‘teacher’ when we are discussing practical applications and ideas that directly involve teacher participants in PY-1.

- Build and raise awareness about issues of importance to their community (local, national and global) through choice and expression of game themes and narrative.
- Engage in positive, virtual communications with diverse communities.
- Practice 21<sup>st</sup> Century skills such as digital creativity and innovation, virtual collaboration and team work; cross cultural understanding; media technology and computing fluency; and learning of self-determination and reliance.

In the Globaloria program, we encourage students in collaboration with their teachers to develop projects centering on a social and educational theme, and support the 21<sup>st</sup> Century Content Standards and Objectives required by the West Virginia Department of Education (<http://wvde.state.wv.us/policies/csos.html>). Students' creation of games that have an educational purpose have been found to enhance the learning of the game knowledge domain considerably, leading to significantly elevated test scores in the given knowledge domain (e.g., the math games students designed in Harel, 1991). However, not as much is known about the effects on teacher learning or extent and durability of teacher change in practice as a result of these gaming experiences, as well as the effects of concurrent participation in online communities of practice, using social networking tools.

Educators and students are encouraged to choose a theme that is both educationally important and of personal interest to them, to conduct research on the game subjects chosen and to relay and express a collaborative progression of their ideas using game design as a process and medium of expression. This type of constructive activity has been found to hold particular power for learners of all ages in developing both their technology skills and abilities, and their knowledge in the given knowledge domain – the game's subject or theme -- in construct together (Harel, 2002). Additionally, educators are encouraged to individually and collaboratively reflect upon their experiences and share new ideas about their teaching practice on the Globaloria Educator Wiki.

The following section presents the rationale for choosing West Virginia for this project.

### *1.3 Rationale for Globaloria-West Virginia*

West Virginia was chosen to launch a **state-wide** Globaloria program because of its large rural population and its lower wage population. Additionally, West Virginia was targeted because of the state's longstanding commitment to education and economic development for its rural, poor citizens. The research literature provides important information about the outcomes of 21<sup>st</sup> century TPD programs that were populated with early adopters, teacher leaders and others who had interest in learning how to integrate new technologies into their classrooms. Although there are many reports on the "digital divide," it is not so clear how and to what extent new technologies and the pressures to change teaching practice have influenced the "regular" classroom teacher, particularly in poor rural settings. We made the commitment to reach educators who were not early adopters, who were not leaders in technology integration (although many of our educators are leaders in other areas) and who had little experience using digital media in their teaching. These decisions did raise some particularly vexatious issues during implementation of our teacher professional development programs in PY-1, but we also found many moments of progress and change.

An entrepreneurial spirit shaped the beginnings of Globaloria in West Virginia, and it continues as we become more deeply engaged in setting a long term course. Initial recruiting and selection of participating schools occurred with state officials who invited educators from several randomly chosen school systems. The governor and first lady of West Virginia were key supporters and the Governor's Office supplied the seed money for initial implementation. The funding from the Benedum Collaborative was not in place until after the PY-1 teachers were attending their first meetings with Globaloria, indicating both a leap of faith on the part of the Globaloria staff, and fast supportive action from the Governor's Office. Six schools chose to participate initially, and one middle school joined at mid-year. We had not intended to include a middle school in this initial year because it was thought that middle schoolers would be too challenged by the gaming software and all of the networking required. This did not prove to be the case, and this school continues to be a successful participant in Globaloria.

For more details about the Globaloria-WV project and operations, see Appendix A of this report, which provides 2 tables detailing the implementation context for each pilot location, in the Fall 2007 and Spring 2008 semesters (including # of educators, # of students, weekly time spent on Globaloria, etc.).<sup>6</sup> In the next section we describe the types of support initially offered to teachers in PY-1, and some of the issues that arise in networked TPD design.

#### ***1.4 Issues and Ideas: A Networked TPD Environment***

One of the major challenges for Globaloria was to find a balance of face-to-face and online learning experiences that would best support educators in PY-1, keeping in mind that the long-term goal was to ramp up to online networks as the primary support system. We wanted to demonstrate that even with varying skill levels and varying purposes, teachers could effectively use the networked environment to achieve their goals in the Globaloria program. These goals raised issues of scaling and sustainability, especially when thinking about TPD design.

Online and blended teacher professional development programs tend to either be 'boutique' or 'general' in terms of the intended audience and purposes, and these design features impact scaling and sustainability (Ketelhut, McCloskey, Dede, Breit, & Whitehouse, 2006). "Boutique" programs develop from local needs or easy access to certain resources. This program can be easily customized to suit a specific audience, or use access to unique resources to provide TPD tailored to the needs of the learners. A very successful example of a boutique program that uses unique resources tailored to a specific audience is the TPD provided by the American Museum of Natural History Seminars on Science (<http://www.amnh.org/education/teachers/>). The program teaches the scientific inquiry process using artifacts available in the museum, and engages pre- and in-service science teachers with scientists and interactive media in its online program. In this case, online TPD can be effectively sustained and scaled up because there is no geographical or time restriction and educators from around the world can participate in the courses. However, if grant funding runs out or the needs of the target audience change the program may disappear.

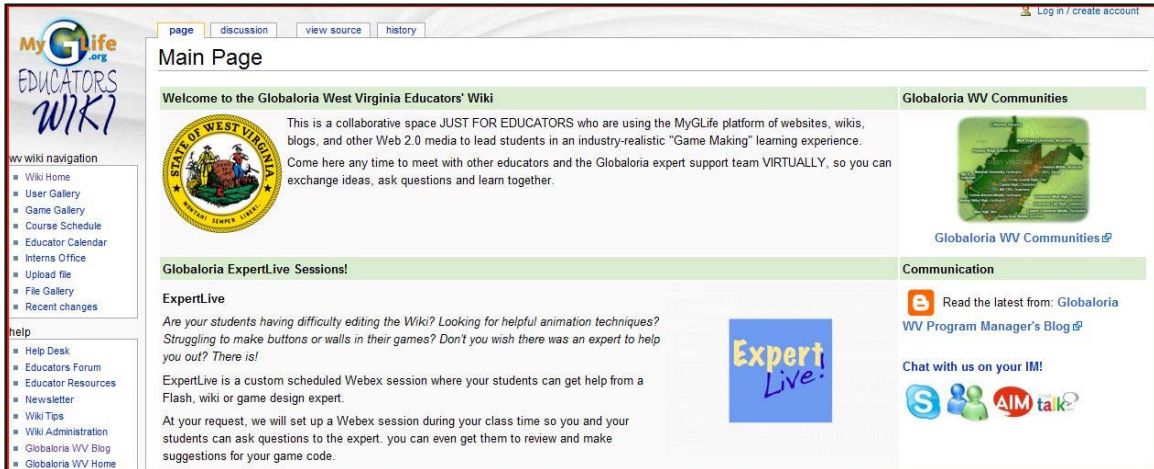
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<sup>6</sup> You can also find out more about Year-1 implementation in the Foundation's Report #2, "Globaloria-West Virginia as Model for a State-Level Network for 21st Century Learning" (Reynolds & Harel Caperton, 2008, in progress).

The “general” TPD program arises from more broadly defined needs determined by research and policy. A good example of the general program and its pitfalls is the first iteration of Indiana University’s Inquiry Learning Forum, designed to improve 5-12<sup>th</sup> grade math and science teachers’ pedagogical practices. The researchers discovered that teachers did not participate frequently or to the depth expected in this rich video- and text -based online learning space. In fact, it was the classic “build it and they will not come” problem that plagued so many online TPD programs in the early years of developing online programs. A key finding was that the initial program design did not take into account the complex design needs of the individual teachers and school culture, as it imposed a top-down research-based model of TPD (Barab, MaKinster, & Scheckler, 2003). However, the purpose of exploring the features of boutique and general TPD programs is not to characterize the features of either type as good or bad. The purpose is to illustrate the affordances and constraints that need to be taken into account when designing TPD, and how to balance the affordances and constraints in ways that support the needs of the learners and the learning goals.

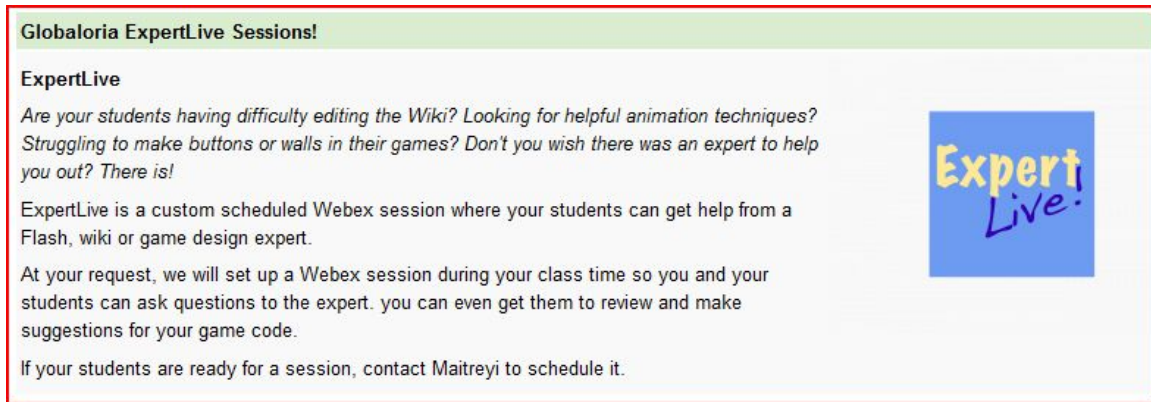
Globaloria TPD design is a blend of general and boutique design features because the learning experiences are based in-school TPD tailored to the specific needs of the teachers, and based on online social networking tools (such as wikis, blogs and synchronous communication tools) intended to answer the needs of varying levels of teacher expertise and learning needs. Few of the educators had previously participated in their own game design projects, or led students in game design learning. Most had never used a Wiki or posted to a blog, and none had ever used a Wiki as a pedagogical strategy for project management purposes to carry out a design project with students both online and in class. Due to budget constraints, our support to educators was more limited in the first year, and some added supports were made on the fly, as the year progressed and the budget was secured. As can be observed in the screen shots and table below, best practices for teacher professional development were often either ramped up or added as educator needs became apparent; particularly a shared educator community space, integrating the program in the school day, and providing both face to face and online learning experiences that were ongoing and tailored to the needs of the educators and students as they became more deeply engaged in the gaming software.

The following screen shots and table are illustrative of the types of supports provided to educators participating in Globaloria. In Figure 3 below, the Educators Wiki was launched mid-point in the first semester to provide needed support and a central communication point for educators.



**Figure 1 Educators' Wiki**

This screen shot shows a sample of the educators' wiki developed for all educators in Globaloria to share experiences and find help and support. Educators were strongly encouraged to build community and share their experiences, in their own school and beyond—note the links to Skype, Windows Instant Messenger, and Google Talk. Teachers and students are encouraged to browse the Game Gallery and to share tutorials that they have created along the way.



**Figure2 ExpertLive**

ExpertLive Sessions were added in Spring 08 so that teachers and students could interact in real time with an expert in design, Flash, etc. As the screenshot illustrates, it is easy to set up a synchronous session in class to help all learners progress in their game design and development.

### 24/7 Virtual Support for You and Your Students

As Globaloria participants, you receive ongoing virtual support from the World Wide Workshop Foundation's team and partners. You have extensive access to the Program Manager, Curriculum and Platform Development team, as well as Flash and Game Development experts. Below is a list of the various support mechanisms you can utilize.

#### Check-In Calls

Throughout the school year you will participate in regularly scheduled check-in calls. These calls will be conducted to get a status report on progress in the classroom, brainstorm new ideas, and troubleshoot any challenges that you might be facing. Key information that will be discussed in the call include individual student progress, completion of administrative tasks such as completing and returning consent forms, and collaboration on scheduling activities. We will also discuss any technical issues that might have surfaced such as how to get additional software or how to get Flash support for a specific issue. Finally that call is used to reflect on your progress and energy level with the program.

#### Web Conferences

Globaloria uses the WebEx online collaboration platform to deliver to key support activities, monthly Mini-Workshops for educators and regular 'Expert Live' Sessions for students.

#### Mini-Workshops (Educators)

The monthly mini-workshops will be delivered one evening each month on topics that you will be addressing with your class in the up-coming months. Prior mini-workshop topics included creating narrative stories in Flash, game and presentation evaluation, and ActionScript. The mini-workshop sessions are recorded and made available for playback at your convenience.

#### Expert Live Sessions (Students)

Expert Live sessions are just-in-time, live, online sessions delivered through the WebEx platform on topics typically with one or two schools in participation. During these sessions, experts work directly with students and educators to problem solve game ideas, game design, and technical walls that surface during the school year. The session is delivered during the classtime and students are actually encouraged to show their progress and explain their challenges to the experts. There sessions can also be setup for educators who are wanting to improve their own learning.

#### Program Manager for West Virginia

**Figure 3 24/7 Virtual Support**

24/7 Virtual Support was offered from the beginning, and Globaloria staff was surprised to find that educators preferred phone support over web-based help, and were reluctant to use the online tools for “real” help. It took the united efforts of all Globaloria staff to wean teachers away from the phone, and develop the skills they needed to efficiently search and find the resources and information they needed.

Table 1 provides a summary of the blend of face to face and online meetings, trainings and support provided by Globaloria staff in PY-1. There were many surprises along the way to implementation. For example, Globaloria staff unexpectedly needed to travel from school to school in the initial implementation phase because no one in the participating schools knew how to install the needed software. While vexatious at the time, this problem was compelling evidence that we did indeed reach our target population of teachers and schools who were not early adopters of new technologies, or had developed sophisticated digital literacies.

**Table 1 Virtual and Face-to-Face Events led by Globaloria Team, PY-1**

<b>Educator Events</b>	<b>Focus</b>	<b>Format</b>
Globaloria Informational Meeting for Prospective Educators	1) Program Overview 2) QA session with attendees	In-person, 4 hrs
Two in-person educator training events Sept. 07 and Feb. 08	1) Intensive training on Globaloria core curriculum platform 2) Session on Flash installation and introduction	In-person, 2.5 days each
Six virtual educator training sessions	1) Program related tools and resources 2) Globaloria concepts	Online, one hour
ExpertLive	Teachers and students interact with a live expert, using Webex	Online on demand

The blend of face to face meetings in conjunction with online learning experiences helped educators become more fluent and comfortable using digital media communication and designing tools with their students. However, as discussed briefly, many educators preferred phone calls to discuss issues, revealing a need for even more scaffolding to reach a point where they felt comfortable using the social networking media and vast online resources available. Globaloria staffers guided educators by walking them through the educator and school wikis by phone and as time passed limited phone calls for special issues and problems. The point was to get everyone comfortable using the wikis and online resources for most communication and on-demand support. These support systems are still developing, and the Globaloria project is now embedded in the educators' schools as well as the classrooms in many cases so that it remains relevant to educator concerns about their practice and professional development.

## **2. Theoretical Constructs and Methodology**

The overarching theory that shaped the Globaloria program is derived from Constructionism (itself a blend of earlier theories, such as Piaget's constructivism and Vygotsky's situated learning), which places a value on purposeful learning of a given knowledge domain, using technology as a tool in the learning process. Additionally, we draw from theories of how people learn, such as distributed cognition, cognitive apprenticeship and situated learning. Learning by design is not a new idea, and it has been implemented in many schools as project-based or inquiry-based learning. The role of these theories in TPD design requires fuller discussion and connection to current TPD research models.

### ***2.1 Learning Theories: The Role of Constructionism in Globaloria***

Constructionism is a philosophy and framework for learning and educative action that was generated by Seymour Papert and colleagues in the 1970's and 1980's – in the early days of personal computers. Papert, who worked with Jean Piaget in Geneva in the 1960's, builds upon Piaget's ideas about constructivism, which view young learners as mini-scientists and inventors whose active creative work in theory building and testing develops their own knowledge structures and epistemologies of the way the world works. Many of Papert's original ideas are outlined in his key paper *Thinking* (1978) and his well-known book *Mindstorms* (1980). In our turn, we build upon the theory of Constructionism to further develop new ways of understanding how teachers teach and learn, and to improve teacher and student learning in a 21<sup>st</sup> century context.

Constructionism views technologies such as software and networked computing environments as tools, to be used to serve a project-based constructive design need in the learning. In Constructionism, a learner's given design project drives the technology use, and technology skills are learned in an integrated way, along with the domain of the creative activity. In this way, technology serves as a means, not an end skill to be learned as a goal in itself, and learners' technology projects take on a more meaningful purpose, which leads to deeper, more transferable acquisition of knowledge. It has been proven over decades of research that learners' conscious construction of a computational artifact, as a technologically-mediated public entity, builds knowledge and meaning for the learner and his or her peers (Harel & Papert, 1991; Salen &

Zimmerman, 2003). We take this idea further, and argue that both process and product are essential to develop skills and knowledge that are transferable across learning contexts for teachers as well as students. Kafai and Resnick argued that there is a natural intersection between Constructionism and design—that over time, learning theorists have come to appreciate the importance of process and product, while designers have come to appreciate the importance of the process of getting to the final product (Kafai & Resnick, 1996). This is particularly important for developing a TPD research agenda and developing effective teacher learning contexts. These ideas lead one further to consider the importance of the social construction and community of learner interactions that are key features of process and product.

Papert's Constructionism address the role of social interaction and role-taking that occurs in project-based learning with technology. It incorporates elements of the social cognitive theory of Vygotsky, who emphasized the role of the social environment and social and cultural interaction in knowledge construction and learning. In Globaloria, we build on this theoretical foundation with the work of Lave and Wenger on situated learning (Lave & Wenger, 1991) and the seminal communities of practice theory developed by Wenger (Wenger, 1998). Social learning (social cognitive) theory suggests in part that we learn by observing and imitating others, adopting cognitions and enacting representative behaviors of others until we more fully appropriate them ourselves. These ideas are closely related to the work of Collins, Brown, and Holum who introduced the Cognitive Apprenticeship, an instructional paradigm intended to make thinking visible (Collins, Brown, & Holum, 1991). The researchers argued that the key differences between a traditional apprenticeship and a cognitive apprenticeship are the following:

- Modeling includes making teacher thinking visible to learners
- Learning (when it takes place in a school and not the workplace) is situated in a real world context that allows abstract and simple tasks to arise in contexts and a timeframe that make sense to the learners
- Transfer of skills and concepts are important for school contexts. Learners must be guided to articulate the connections between common skills and concepts that reach across content domains.

Within Globaloria, , more expert peers serve as guides for educators, intervening on an as-needed basis, and helping and “scaffolding” learning as educators teach, model and share with each other along the way -- in a blended learning environment. Perkins argued that transforming education involves “playing the whole game,” by leading learners to be problem finders as well as problem solvers (Perkins, 2009), and as can be seen in the graphic below, there are multiple opportunities for educators to find problems, solve problems and share the experiences in Globaloria.

Within Globaloria as a whole, the following educator and student interactions, and thereby, opportunities for learning, are made possible, however the nature of the learning and the context are not the usual blended learning environment.

## Social Learning Opportunities Present in Globaloria

### Self-learning:

- Educators, students individually explore and find network resources

### Peer learning:

- Educators learn from other educators
- Students learn from other students

### Co-learning:

- Educators and students learn together

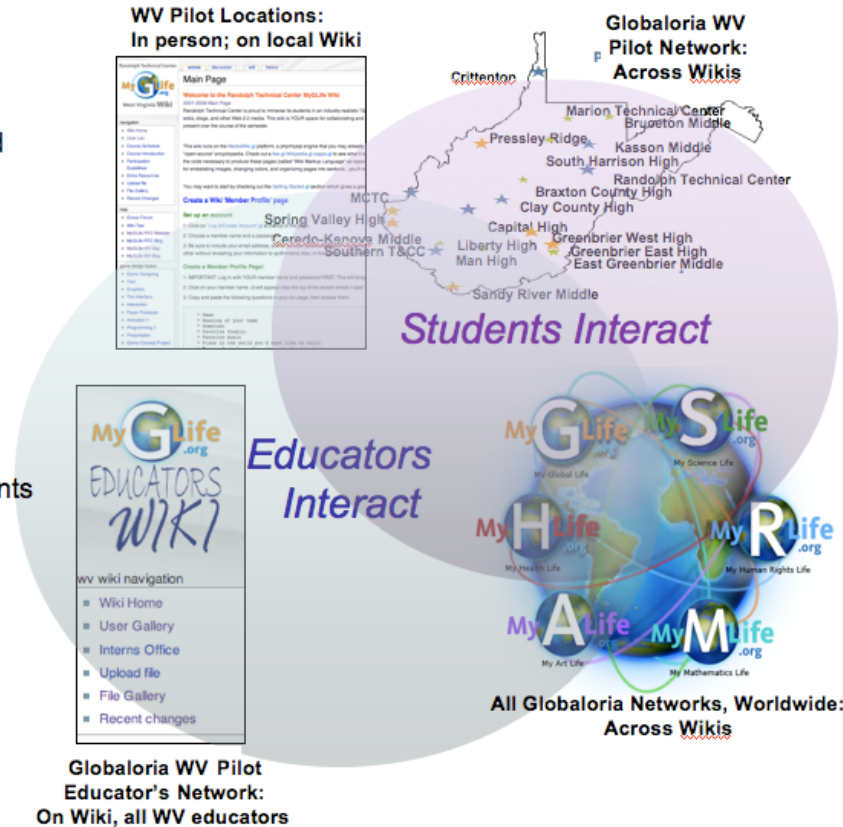


Figure 4 Social Learning Opportunities Present in Globaloria

The networked learning environment extends the idea of blended learning environments to “blurred” learning environments. The main features of blended learning environments are combining online learning spaces with face-to-face learning contexts. Blurred learning environments feature learners working synchronously across distance working face-to-face with a group that may or may not be in the room. The meaning of being “present” blurs as one works across time and distance in a networked learning environment.

Taking into account the learning theories discussed, and the blurred network environments, we next discuss TPD, particularly through the lens of new research on how teachers learn in networked learning environments.

### 2.2 Teacher Professional Development Theories and a “Blurred” TPD Model

The teacher professional development (TPD) model offered by Globaloria includes several features that a preponderance of scholars in the field agree are necessary to provide high quality TPD that may lead to durable teacher change and improved student outcomes (Wayne et al., 2008).

- TPD is and embedded in the school<sup>7</sup> and in the classroom, as well as across classrooms and school systems across the state
- TPD provides ongoing support in the school that allows educators to see and share their own and student work reflectively
- TPD provides support for developing a teacher learning community both online and face to face that creates a safe environment for testing new ideas and new teaching ideas

While these strengths in TPD design are important, there are other factors that must be taken into consideration as well. Web 2.0 with its social networking capabilities, the continued development of online professional learning communities, and new research on blended learning environments suggest that TPD design models must also draw from theories of distributed cognition, as well as Constructionism. Perkins wrote that distributed cognition is the “dispersal of intellectual functioning across physical, social, and symbolic supports... (Perkins, 1992, p. 134).” If we consider what this might mean in blended TPD learning environments using digital media and social networking tools, there are effects *of* technology and effects *with* technology. Salomon, Perkins and Globerson (1991) argued that computers might be thought of as “partners” in cognition because computers can perform certain functions more quickly and accurately than humans. For example, complex mathematical problems, storing and sorting information and collating information are evidence of “partnering.” These are effects *with* technology, because they are the “empowerment that results when we have the technology at hand” to support our work. Further, Angeli argued that distributed cognition should be “considered as hybrid systems comprised of humans and physical artifacts” (Angeli, 2008, p. 272). In terms of TPD and Globaloria, the key features of distributed cognition are woven into the constructionist design, as educators partner with digital media, social networking tools and face to face meetings to support their work and their learning. In order to further organize the important dimensions of teacher learning into analyzable form, we also draw from the seminal work of Bransford, Brown and Cocking. Hooper argued that “Programmable media for learning is distinguished by its ability to encourage students to think differently about content than they would with other media (Hooper, 2008, p. 123).” Bransford and colleagues argued that new findings on how students learn also apply to how adults learn, particularly when combined with activities that promote metacognitive reflection (Hammerness et al., 2005). We build upon their work and that of Hooper because we argue that digital media and learning by design helps teachers think differently about content than they would with other media, and we believe that thinking differently will help lead educators to effective change in practice. Although there are many well constructed models for TPD, we have chosen to use the model described below because it was developed to include how new technologies might support teacher learning and networking.

We use a matrix adapted from the Dimensions of Effective Learning (DEL), developed by Bransford, Brown and Cocking (Bransford, Brown, & Cocking, 2002). The adaptation, Teacher Dimensions of Effective Learning (TDEL) draws from the research literature on how teachers learn as discussed in *How People Learn* by Bransford and colleagues, as well as from teacher professional development research literature (Whitehouse, 2006). It represents four research-based dimensions that must be present for effective teacher learning and provides a guiding framework for our research:

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<sup>7</sup> In Year Two we are working with school principals more closely.

- **Learner-Centered Learning Dimension**
  - Teachers are active participants and are active partners in decision-making about TPD
- **Knowledge-Centered Learning Dimension**
  - Supports development of technological pedagogical content knowledge in context of the needs of the learners learners (TPACK + L)
- **Community-Centered Learning Dimension**
  - Supports teacher professional growth and development through professional learning communities and ongoing professional development
- **Assessment-Centered Learning Dimension**
  - Teachers collaborate by sharing experiences in teaching and provide effective peer critique of pedagogy and assessment practices
- **Culturally-Centered Learning Dimension**
  - Teachers appreciate and explore cultural differences that span from their students to themselves, and ranging from economic, social, racial and ethnic differences and similarities

Table 2 lays out the TDEL as the dimensions intersect with the following variables: learners, pedagogy and technology. These variables were drawn from the work of Borko (2004) and are considered key design variables for teacher professional development. In Borko’s work, the third variable was context, and in this case, we have used technical design as the context because technical design decisions about the communication and digital media used are key factors in the teacher learning experience. Crossed with the Dimensions of Effective Learning, the variables create an analytic matrix through which to frame and explore the design of teacher professional development in Globaloria.

**Table 2 Teacher Dimensions of Effective Learning**

TPD Dimensions	Key Design Variables for TPD		
	Pedagogy	Teacher as Learner	Technical Design
<b>Learner-Centered Learning Environments</b>	Builds on strengths and needs of teachers; acknowledges the experiences and knowledge they bring or lack of	Active participant bringing their pre-existing knowledge and experience, and learning goals to the learning context and to generate new goals	Supports sharing of ideas, experience and facilitating change and growth
<b>Knowledge-Centered Learning Environments</b>	Supports development of technological pedagogical content knowledge in the context of knowing the needs of the learner; building new mental models of teaching	Brings their own preconceived notions to the learning; need to participate as learners	Digital media that support building new mental models about practice; support building new domain/content knowledge connected to learning teaching strategies that are not

TPD Dimensions	Key Design Variables for TPD		
	Pedagogy	Teacher as Learner	Technical Design
			about showing the way, but encourages educators to appreciate the difficulties and value of “getting stuck.”
<b>Community-Centered Learning Environments</b>	Establishes norms to form collaborative peer and stakeholder relationships; cultivate and supports action research on practice teacher as researcher. Teachers as anthropologists, etc. all of the tools we are using capture process data. There is transparency.	Are part of an existing culture of learning and teaching in own school or professional context	Space to share/reflect on student work and teacher work; place to share successes and failures; shared discourse on data on student learning and teacher learning space to share/reflect on self learning. Stressing self learning and bring your self-learning to your student learning
<b>Assessment-Centered Learning Environments</b>	Provides opportunities to test new understandings of concepts and skills; supports action research	Brings own ideas about how to give and receive feedback; often not experienced in giving effective feedback or in action research	Promotes/supports structured individual and group reflection and feedback; sharing of research findings and changes in practice
<b>Culturally-Centered Learning Environments</b>	Provides opportunities to bring questions and ideas about how the many aspects of culture impact teaching and learning	Promotes/supports exploration of one’s own culture and how it impacts teaching and learning	Promotes/supports collaborative thinking and discussion on how the many aspects of culture impact teaching and learning

### *2.3 Developing Our Research Questions*

After PY-1, we realized that our emerging research questions should be part of a complex longitudinal collaborative research project that stretches across school systems, universities and states. We believe that the future of research on learning and TPD must include school/university partnerships that support a distributed research design that invites researchers across disciplines and areas of expertise to collaborate as they explore the rich data generated by Globaloria. By working together across disciplines on similar research questions, we can bring robust findings that help us extend our understanding of how to provide the most effective TPD, as well as extend our understandings of student impacts. At this time, research partners from West Virginia

University, Marshall University as well as other higher education institutions are working with Globaloria, although not as collaborators yet. We plan to begin structuring these collaborations during Y-2.

A series of research questions emerged over the course of the pilot first year (PY-1). They are organized below in a table that lists the TDEL in one column, with the related research questions in the second column. This table gives the reader an opportunity to see how one might structure further empirical research to build and rethink Globaloria, build collaborative school/university partnerships in research and program implementation as well as contribute to the field of teacher professional development. The pairs of questions in the Research Questions column represent an evaluative perspective that provides practical information for program rethinking and redesign and an empirical question that may help us explain why certain features of the Globaloria work well and how to further develop the model.

**Table 3 Research Questions in TDEL Framework**

<b>TDEL</b>	<b>Research Questions</b>
<p><b>Learner-Centered:</b> Active participants/Active Partners</p>	<p>What attitude shifts towards technology, learning and Constructionist pedagogy do educators experience as a result of participating in Globaloria?</p> <p>In what ways do learners as educators rethink their practice and does it change their practice?</p>
<p><b>Knowledge-Centered:</b> Development of technological and pedagogical content knowledge (TPACK+L)</p>	<p>How much knowledge of Web 2.0 skills and interactive game design is needed for teachers to most effectively guide student learning?</p> <p>Why and to what extent do the skills and conceptual knowledge that teachers develop in Globaloria change their teaching practice and their ideas about teaching, particularly around TPACK?</p>
<p><b>Community-Centered:</b> Development of professional learning communities embedded on the network to support ongoing teacher learning</p>	<p>In what ways does each educator participate and contribute to the growth of the Globaloria-WV educator community of practice?</p> <p>How and to what extent does participation in Globaloria impact teaching and professional development at the school, local and systemic level, taking into account the blurred dimension of what it means to work in a networked environment?</p>
<p><b>Assessment-Centered</b> Support of safe spaces to question, critique and take chances in teaching practice.</p>	<p>What best practices does each of the educators demonstrate in her mentorship of students?</p> <p>Why and to what extent do educators change their ideas about effective assessment of their teaching practice and that of their colleagues?</p>
<p><b>Culturally-Centered</b></p>	<p>How and to what extent do the varying aspects of culture impact a networked learning and teaching environment, particularly taking into account the notion of blurring.</p> <p>What strategies do learners employ to share learning and collaborate?</p>

Our original guiding question:

*What types of 21<sup>st</sup> century teacher professional development (TPD) are necessary to respond to the shifting priorities of K12 curricula?*

We believe that the answers to the questions in the matrix and other research questions that arise in the course of data gathering and analysis will contribute in effective ways to 21<sup>st</sup> century teacher professional development as well as continuing the development of Globaloria.

Additionally, the matrix highlights important concepts of learning by design, such as process (building community, knowledge creation, and assessment) and products (games, tutorials, etc.) that may contribute to theory and building new TPD models. The social networking tools that support teacher learning in Globaloria make it possible to see process and products as they are captured by participation in the wiki and other online working spaces. It is also important to address standards and abilities as they apply to TPD because they arise from research and policy requirements that play a major role in the content of TPD programs.

### **3. Standards and Abilities**

Traditional approaches to teacher professional development have focused on the importance of imparting specific technology skills, and are often driven by particular standards, for instance the National Technology Education Technology Standards (NETS-T) technology literacy standards promoted by the International Society for Technology in Education (ISTE), and the InfoPower technological standards information literacy standards promoted by the American Association of School Librarians (AASL) and the American Library Association (ALA). These organizations have typically positioned technology skills as an end goal, and prescribed and recommended a range of different lessons and strategies for integrating technology skills into school curricula and professional development – most often as distinct and separate from existing traditional academic disciplines, and most often with a lesser extent of prioritization (e.g., less time available, less credit provided, elective status, etc.).

We argue that while it is necessary to learn how to use new technologies, it is even more important to learn to use new technologies connectedly in ways that support the content to be learned and the needs of the learners. One way to think further about this issue is to look back at previous scholarship that explored how to balance the connections between teaching methods, content and learners (TPCK<sup>8</sup> + L is included in the TDEL). Shulman's groundbreaking work in connecting pedagogy to content (pedagogical content knowledge or PCK) highlighted the importance of thinking about teaching connected to content during a time when teacher education schools tended to focus on either pedagogy or content (Shulman, 1987). Mishra and Kohler built on the work of Shulman by offering a new model of PCK that includes technology (technological and pedagogical content knowledge or TPACK) that emphasizes the intersections of technology, pedagogy and content (Koehler & Mishra, 2008). We build on this argument by adding another element to the mix: the learner. We posit that knowing the learner and their needs is an integral part of TPACK. We think of it as technology and pedagogical content knowledge

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<sup>8</sup> At this time, TPACK and TPCK appear to be identical in meaning.

plus the learner (TPACK+L). We offer the Six Contemporary Learning Abilities in the next section to illustrate how the needs of the learner intersect with technologies, pedagogy and content in the Globaloria program. We believe that these abilities are necessary skills that extend the basic knowledge of tools to the level educators and students must develop to live and work efficiently in our networked world.

### ***3.1 Six Contemporary Learning Abilities***

The Six Contemporary Learning Abilities emerged during PY-1 as we tracked the progress of our teachers as they worked with Globaloria. They arise from the observations of Globaloria staff and researchers, and the observations of teachers participating in Globaloria. The abilities highlighted are not exclusive; occur in parallel and are achieved through participation in an integrated set of Constructionist activities. The current typical view of “21st Century Learning Standards and Skills” applied in most state-based and school-based programs emphasizes the importance of only a few of the abilities -- mostly Types 5 and 6 (e.g., see 21st Century Learning Association - [www.21learn.org](http://www.21learn.org)). Similarly, the teacher professional development programs that address the so-called “21st Century Learning Skills” tend to measure only Types 4, 5 and 6 of the 6CLAs. We believe our framework is the first to delineate and prioritize abilities 1, 2 and 3 above in the context of digital literacy initiatives, with a theoretical linkage to Constructionism, distributed cognition and teacher learning.

First, we present the contemporary learning abilities sets themselves, as well as a range of activities promoted by Globaloria, that we hypothesize help to cultivate these essential abilities in today’s educators as well as students. The framework is the first to propose integrating Constructionist elements into the domain of applied “digital literacy” typologies. The 6CLAs framework is still currently under development and will be refined as our research continues. Then we highlight them in the context of the TDEL framework in Table 3 below. We believe the development of these abilities will enable educators to become successful teachers in the global knowledge economy of Web 2.0 digital work.

**Abilities Set 1** is called “*Invention, progression and completion of an original project idea*” and is the cornerstone of the framework. CLA 1 is the dimension that is most fundamentally linked to the Constructionist tradition, in that it highlights the learner’s establishment of a *purpose* for engagement in project-based work. In the context of our programs, it involves the development of the game idea and narrative, which requires creative, original thinking by the student and the teacher, who in many cases creates a game focusing on a subject of self-chosen interest. The educator guides the learner, who chooses and develops his or her own game idea, and may conduct research to elaborate the game’s theme. In Globaloria, we promote the choice of game ideas that have a social or educative mission. Educators learn to program in Actionscript, and develop pedagogical strategies to support the process of designing. This programming interplays with the development of their game ideas. We hypothesize that it is the interlinkage inherent in designing and developing games with a purpose, and using a computational process (in this case, Actionscript coding and Flash development), which may lead to powerful cognitive gains. We further hypothesize that the process leads to cognitive and developmental gains for the educators. Our continued research will focus on further exploring this hypothesis.

**Abilities Set 2** is called “*Project-based learning and project management in a networked environment.*” Here, we add to the picture Web 2.0 tools such as Wikis and blogs for facilitating communication, collaboration, and project management by educators. Engaging in game design in a group context, and in many cases as a team effort for a given game, is made more feasible when an online environment such as a Wiki is employed as a platform in which educators can post their in-progress artifacts, share files, gain ideas from their peers, and organize the continued project management by team members. We argue that this is a primary ability to be developed for effective 21<sup>st</sup> Century teaching and a key feature of embedded peer-directed teacher professional development.

**Abilities Set 3** is called “*Publishing and distribution of digital media.*” In this CLA, we are emphasizing online presentation of a learner’s work, both in-progress and upon completion. The Globaloria program adopts an “open source” spirit, and all of the assets and artifacts of learners in our program is available online for other users to learn from and use in their own work, under the Creative Commons criteria that requires attribution. In cultivating this ability, learners and educators come to better understand copyright issues, and learn more about democratic participation and sharing of work among each other in an open online setting. We hypothesize that these activities lead to new realizations about effective assessment practices for educators.

**Abilities Set 4** is called “*Social-based learning, participation, and exchange in a networked environment.*” This CLA emphasizes the general socializing and camaraderie that is built up among a given set of educators, and among team members as they use social media to become more cohesive as a “community of practice.” It also entails the development of presentation skills, when final projects are presented to peer groups and to outside evaluators. This is another key strategy we have adopted in Globaloria projects to-date, that has gained a significant amount of favor from our participating educators who see the benefits that students gain from learning to articulate their ideas and discuss their design process in repeated public speaking opportunities. We hypothesize that educators will benefit by learning to bring in outside evaluators and become more sophisticated in assessment practices that effectively measure what students know and understand. Further, we believe educators will develop collaborative skills that support their teaching in a variety of contexts.

**Abilities Set 5** is called “*Information-based learning, search, & exploration.*” This CLA emphasizes the self-learning aspects inherent to Globaloria, in that it entails the online search for tutorials and resources supporting students’ game design projects. Educators may search the MyGLife.org recommended tutorials available in our Starter Kit website. Importantly, they also learn to search more widely online for resources that support a specific need as they engage in the creation of the projects. We hypothesize that this self-learning process may be a highly extensible skill that our educators cultivate, and may enhance their feelings of self-determination and personal autonomy as professional educators.

**Abilities Set 6** is called “*Surfing other websites and web applications.*” In the context of our program, this CLA specifies the general ability of educators to find and play online games, in order to learn more about features they may wish to encourage students to include. It also specifies the ability for educators to effectively navigate our web environments and the internet more generally. Although this learning ability appears to be of lower cognitive quality than the

previous five abilities sets, we hypothesize that developing these skills may lead to higher degrees of technical fluency and lead to more frequent use of these skills in teaching contexts other than Globaloria.

**Section 3.2 6CLAs Hypotheses**

We present the following set of hypotheses for our research with teachers in this report, based on the 6CLAs defined in the previous section. We frame these hypotheses within the TDEL framework in order to highlight the digital literacies and technical fluencies that teachers and learners need in order to teach effectively in a 21<sup>st</sup> century classroom, and to highlight the need for further research in understanding how, why and to what extent teachers develop them.

1. *Learner- Centered Learning Dimension:* The CLAs may promote increased teacher self-efficacy around technology use and self-determination in a democratic learning process
2. *Knowledge- Centered Learning Dimension:* The CLAs may promote powerful gains of expertise for educators, particularly in terms of growing and developing new concepts of teaching and learning that arise from developing technological pedagogical content knowledge in innovative learning contexts.
3. *Community-Centered Learning Dimension:* The CLAs may promote effective collaboration among educators within their own learning contexts, with the potential of expanding across a variety of learning contexts using appropriate social networking and communication tools.
4. *Assessment- Centered Learning Dimension:* The CLAs may promote development of new and more sophisticated assessment practices that arise from peer-learning, co-learning with students and self-reflection and self assessment in the Educators’ Wiki.
5. *Culturally-Centered Learning Dimension:* The CLAs may promote new appreciations and expertise in designing games that appeal across cultures, and change how educators think about game design for differentiated instruction.

We believe that students and teachers will benefit in terms of expanding their life chances and life choices as a result of gaining significant fluency in the six CLAs.

The 6CLAs framework is presented in the TDEL matrix. Please note that a dimension may appear more than once in the table. At this early stage of analysis and model building, we have not yet parsed down to cleaner definitions for each CLA, through the lens of teacher learning. This work is ongoing, and will appear in the Year Two report, as well as in various research journals and conferences.

**Table 4 Six Contemporary Learning Abilities**

<p><b>Knowledge-Centered Learning Dimension</b> Building higher order thinking and supporting development of creative technological pedagogical content knowledge.</p>	<p><b>Abilities Set 1. Invention, progression, and completion of an original project idea for an educational game or simulation. Brainstorming and developing game ideas with others (using Web2.0 tools such as Blog, Wiki)</b></p>
	<p>Choosing a subject for the game project</p>
	<p>Conceptualizing an original approach to teaching the subject of the game</p>

<p><b>Cultural-Centered Learning Environment</b></p> <p>Take into account the differing expertise and knowledge that learners bring to the learning.</p>	<p>Generating creative ideas and designs to express the subject of the game</p> <p>Planning execution using storyboarding, paper prototyping, etc.</p> <p>Writing (and revising) a game proposal</p> <p>Completing online tutorials and assignments that facilitate game design and development</p> <p>Completing an interactive game demo that illustrates planned game design &amp; functionality</p> <p>Completing a final game project using Flash software</p> <p>Developing knowledge of the game's domain or topic through game creation</p>
<p><b>Knowledge -Centered Learning Dimension</b></p> <p>Primary ability for 21<sup>st</sup> century learning and rethinking of teaching strategies and content knowledge. Rethinking content, personal knowledge, and TPACK+L</p> <p><b>Community-Centered Learning Dimension</b></p> <p>Establish norms for participation.</p>	<p><b>Abilities Set 2. Project-based learning and project management in a networked environment</b></p> <p>Completing online tutorials and assignments that facilitate learning of project planning and management skills</p> <p>Managing the project using the wiki (creating wiki pages, organizing and formatting the wiki, sharing assets, info, feedback and progress updates, etc.)</p> <p>Creation of a written game proposal (including design document, user flow, budget, schedule, introduction, overview, treatment, competitive analysis, team introductions, etc.)</p> <p>Managing team projects and one's role within the team</p> <p>Project troubleshooting for self and others</p> <p>Gaining project management and leadership experience</p>
<p><b>Community Centered Learning Dimension</b></p> <p>Establishes norms for collaborative peer and stakeholder relationships: democratic participation and sharing of work</p> <p><b>Assessment-Centered Learning Dimension</b></p> <p>Sharing and providing effective feedback about progress, ideas and development of new methods for teaching and learning</p>	<p><b>Abilities Set 3. Publishing and distribution of digital media</b></p> <p>Creating a wiki profile page, project pages, etc.</p> <p>Integrating text, video, photos, audio, programming code, animations, digital designs - on the wiki</p> <p>Posting Flash tutorial assignments to wiki</p> <p>Posting Flash game design iterations and assets to wiki</p> <p>Posting notes about own projects on wiki</p> <p>Posting comments on others' work on wiki</p> <p>Developing a Blog</p> <p>Reading and commenting on Blogs of others</p> <p>Sharing resources (by posting links and imagery of found resources for others to see)</p>

<p><b>Community Centered Learning Dimension</b></p> <p>Establishes norms to form collaborative peer and stakeholder communities of practice: build confidence and technical self-efficacy for students and teachers</p>	<p><b>Abilities Set 4 Social-based learning, participation, and exchange in a networked environment</b></p>
	<p>Collaborating virtually using Web 2.0 tools (wiki, blogs, IM, help forums, etc.)</p>
	<p>Exchanging resources in a network (by posting information, links, source code for others to use)</p>
	<p>Reading and commenting on Blogs of others</p>
	<p>Developing and delivering effective presentations in a virtual space</p>
	<p>Developing and delivering effective presentations in a physical space</p>
<p><b>Learner- Centered Learning Dimension</b></p> <p>Builds on strengths, interests and needs of teachers: builds self efficacy through development of self-determination and a sense of agency</p> <p><b>Knowledge-Centered Learning Dimension</b></p> <p>Primary ability for 21<sup>st</sup> century learning and rethinking of teaching strategies and content knowledge. Rethinking content, personal knowledge, and TPACK+L</p>	<p><b>Abilities Set 5 Information-based learning, search, &amp; exploration</b></p> <p>Searching and finding resources on MyGLife.org; Starter kit website for self-learning</p>
	<p>Search the Web for new Flash resources for self-learning</p>
	<p>Searching the web for answers and help on specific issues related to game projects (using Google, Wikipedia, and other communities, etc.)</p>
<p><b>Learner-Centered Learning Dimension</b></p> <p>Building on strengths, interests and needs of teachers: developing digital literacies and technical fluency</p> <p>Cultural-Centered Learning Dimension</p> <p>Gaining appreciation and understanding of game development across cultures.</p>	<p><b>Abilities Set 6. Surfing other websites and web applications</b></p> <p>Surfing for game examples</p>
	<p>Playing games online</p>
	<p>Keeping track and book-marking surfing results</p>

We believe that this framework can contribute significantly to existing models of digital and information literacy and help build new models of teacher professional development that “get at” important learning skills and concepts in innovative ways. The framework above will be refined as we further develop our learning innovations. We also have used the framework as a set of learning objectives to guide our continued program development (e.g., do the activities we are launching adhere to the framework and promote the abilities we are prioritizing within it?). The next sections share our preliminary findings, and point to directions for further study.

## 4. Preliminary Findings: Revising the Survey

The Pre- and Post-Program Survey presented some general technology use questions to Educators, as well as asking about their participation prior to Globaloria in the 6 contemporary learning abilities that we outlined above. As stated previously, certain activities are better than others in helping cultivate the development of the 6 contemporary learning abilities. Therefore, in our pre- and post-program surveys we asked questions about participants’ motivation towards, and frequency of engaging in the specific activities that we believe are key in developing these essential abilities. In Pilot Year 1, our instrumentation for teachers focused mostly on their own technology use. In Pilot Year 2, we have altered our Educator surveys to address activity on three levels:

1. Their own game design and activity supporting it (Learner-Centered Dimension).
2. Their support of their students (Knowledge-Centered and Cultural-Centered Dimensions).
3. Their collaboration with other educators, on both game design and teaching practices and strategies (Community-and Assessment-Centered Dimensions).

### 4.1 Suggestive Findings from the Surveys, PY-1

- Over half the educators who participated in PY-1 had little or no experience with social networking tools or pedagogical experience working and managing a digital design project
- Educators significantly increased web surfing activities, but did not sustain web publishing activities or use social networking tools.
- Educators indicated a statistically significant motivation to search on the web, publish, create digital media and generate inventive ideas. However, our analysis revealed that there is a significant gap between motivation and engagement—educators engaged in surfing and generating innovative ideas at the statistically significant level, but did not remain active in creating and publishing materials online, nor did they sustain their participation with social networking tools.

These findings, at first blush, might seem discouraging, but they are not, when taken in context. The educators participating in PY-1 began with little or no technology savvy and they have finished the first year with some important skills (recall that Globaloria staff had to travel to

participating schools to load software on the computers). Asking teachers to transform their teaching is a big step, and one that can only be accomplished by taking small steps first. The educators generally were very successful in gaining the most accessible CLAs (see findings below), and made strides in changing their teaching practice that are not visible in this report. We expect Year Two to show more statistically significant gains for the educators who chose to continue their participation. We will also follow up with the educators who choose not to continue in Year 2 in order to understand the nature and extent of any durable and sustainable changes in their teaching.

Here are the main headlines from the Six CLAs research:

- Educators increased frequency of engaging in web surfing and generating project ideas.
- Educators’ *motivation* increased towards information-seeking, publishing and distribution of digital media, and generating creative project ideas.

Further analysis of case-study findings suggest that educators extended their conceptual knowledge and skills to some extent. Further research is required to provide firm empirical evidence of the extent of these gains:

- Knowledge development in Flash design and Web 2.0 expertise
- Attitude shifts, such as greater openness to participate as a co-learner
- Creative thinking around customizing the Globaloria syllabus to suit the needs of their students
- Community building and teamwork with students
- Community building with other teachers
- Transfer of techniques learned in Globaloria into other courses

These findings shaped our recommendations for research on TPD in the coming years. The next section describes our main questions in the context of the TDEL (Table ). We expect that these questions will be refined and revised as we engage in our research.

## 5. Research Questions for PY-2 and Beyond

The following table lays out the data sources for PY-1 in relation to our emerging research questions and Teacher Dimensions of Effective Learning.

**Table 5 Data Sources**

Data Sources	Research Questions	TDEL
Pre- and Post-Program Surveys	<i>Evaluative:</i> What attitude shifts toward technology use, learning and Constructionist pedagogy do educators experience as a result of participation in Globaloria?	Learner Centered Learning Dimension: Active Partners, Active Participants

Data Sources	Research Questions	TDEL
	<i>Empirical:</i> In what ways do educators rethink their practice as a result of participating in Globaloria?	
Transcripts of phone interviews	<i>Evaluative:</i> What attitude shifts toward technology use, learning and Constructionist pedagogy do educators experience as a result of participation in Globaloria?	Learner Centered Learning Dimension: Active Partners, Active Participants
	<i>Empirical:</i> In what ways do educators rethink their practice as a result of participating in Globaloria?	
Analysis of Educator wiki activity	<i>Evaluative:</i> How much knowledge of Web 2.0 skills and interactive game design is needed for educators to most effectively guide student learning?	Knowledge Centered Learning Dimension  Technology pedagogical and content knowledge (TPACK)
	<i>Empirical:</i> Why and to what extent do the skills and conceptual knowledge that teachers develop in Globaloria change their teaching practice and their ideas about teaching, particularly around TPACK?	
Field Notes and Video of teachers and students in action in the classroom and presenting	<i>Evaluative:</i> What attitude shifts toward technology use, learning and Constructionist pedagogy do educators experience as a result of participation in Globaloria?	Learner Centered Learning Dimension: Active Partners, Active Participants
	<i>Empirical:</i> In what ways do educators rethink their practice as a result of participating in Globaloria?	
Educator Progress Reports	<i>Evaluative:</i> What attitude shifts toward technology use, learning and Constructionist pedagogy do educators experience as a result of participation in Globaloria?	Learner Centered Learning Dimension: Active Partners, Active Participants
	<i>Empirical:</i> In what ways do educators rethink their practice as a result of participating in Globaloria?	

Data Sources	Research Questions	TDEL
Participation in Globaloria Tutorials	<i>Evaluative:</i> How much knowledge of Web 2.0 skills and interactive game design is needed for educators to most effectively guide student learning?	Knowledge Centered Learning Dimension  Technology pedagogical and content knowledge (TPACK)
	<i>Empirical:</i> Why and to what extent do the skills and conceptual knowledge that teachers develop in Globaloria change their teaching practice and their ideas about teaching, particularly around TPACK?	

In general, the research questions that have received the most analysis to this point are evaluative in nature, and designed to find out how well the program features are working for educators. This is general practice in a Pilot Year, and essential data to gather and analyze. In the coming months, the connected empirical questions that will give us some explanatory power and generalizability will be explored.

### 5.1 6CLAs Research Questions

The following table sorts the 6CLAs into research questions by dimension. The purpose of the table is to make clear how the 6CLAs and the TDEL work together to highlight both process and product as teachers learn by design.

**Table 6 6CLAs Research Questions**

CLA	Research Questions Drawn from TDEL
<b>Abilities Set 1.</b> Invention, progression, and completion of an original project idea for an educational game or simulation Brainstorming and developing game ideas with others (using Web2.0 tools such as Blog, Wiki)	<p><b>Knowledge -Centered Learning Dimension:</b> Building higher order thinking and supporting development of creative technological pedagogical content knowledge. Come up with an idea and build it.</p> <p>How and to what extent do educators support and develop higher order thinking in their learners?</p> <p>How and to what extent do educators demonstrate higher order thinking skills and increased awareness of and developing TPACK?</p> <p><b>Culturally-Centered Learning Environment:</b> Take into account the differing ways of knowing that learners bring to the learning.</p> <p>In what ways do educators account for cultural and learning differences?</p> <p>How do educators deal with their own cultural beliefs and how does it manifest in their participation in networked environments?</p>

CLA	Research Questions Drawn from TDEL
	<p><b>Community-Centered Learning Environment:</b> Establishes norms to form collaborative peer and stakeholder communities of practice: build confidence and technical self-efficacy for students and teachers</p> <p>How and to what extent do educators devise collaborative work strategies that support brainstorming and idea development?</p> <p>How and to what extent do educators work with their peers to brainstorm and develop project ideas?</p>
<p><b>Abilities Set 2.</b> Project-based learning and project management in a networked environment</p>	<p><b>Knowledge -Centered Learning Dimension:</b> Primary ability for 21<sup>st</sup> century learning and rethinking of teaching strategies and content knowledge. Rethinking content, personal knowledge, and TPACK+L</p> <p>How and in what ways do educators manage project-based learning in a networked environment?</p> <p>How and to what extent do educators engage with each other in managing project-based learning?</p> <p><b>Community-Centered Learning Dimension:</b> Establish norms for participation.</p> <p>In what ways do educators establish norms for participation in a networked environment?</p> <p>How and to what extent do educators engage and participate in a networked environment?</p>
<p><b>Abilities Set 3.</b> Publishing and distribution of digital media</p>	<p><b>Community Centered Learning Dimension:</b> Establishes norms for collaborative peer and stakeholder relationships: democratic participation and sharing of work</p> <p>How and to what extent do educators guide learners in sharing and distributing their products?</p> <p>How and to what extent do educators publish and distribute digital media?</p> <p><b>Assessment-Centered Learning Dimension:</b> Sharing and providing effective feedback about progress, ideas and development of new methods for teaching and learning</p> <p>How and to what extent do educators support and encourage timely and effective feedback of published work, or work in progress?</p> <p>How and to what extent do educators engage in timely and effective feedback for peers and colleagues?</p>

CLA	Research Questions Drawn from TDEL
<p><b>Abilities Set 4.</b> Social-based learning, participation, and exchange in a networked environment</p>	<p><b>Community Centered Learning Dimension:</b> Establishes norms to form collaborative peer and stakeholder communities of practice: build confidence and technical self-efficacy for students and teachers</p> <p>How and to what extent do educators nurture and support collaborative learning and participation in a networked environment?</p> <p>How and to what extent do educators engage in collaborative learning in a networked environment?</p>
<p><b>Abilities Set 5.</b> Information-based learning, search, &amp; exploration</p>	<p><b>Learner- Centered Learning Dimension:</b> Builds on strengths, interests and needs of teachers: builds self efficacy through development of self-determination and a sense of agency</p> <p>How and to what extent do educators guide and support learners to search and explore networked media for problem-finding and problem-solving?</p> <p>How and to what extent do educators search and explore using networked media for answers to questions, problem-finding or problem-solving</p> <p><b>Knowledge-Centered Learning Dimension:</b> Primary ability for 21<sup>st</sup> century learning and rethinking of teaching strategies and content knowledge. Rethinking content, personal knowledge, and TPACK+L</p>
<p><b>Abilities Set 6.</b> Surfing other websites and web applications</p>	<p><b>Learner -Centered Learning Dimension:</b> Building on strengths, interests and needs of teachers: developing digital literacies and technical fluency</p> <p>How do educators guide and facilitate learners as they develop web surfing skills and using web applications?</p> <p>How often and for what purposes do educators surf the web and use web applications? To what extent does their web surfing change over time?</p> <p><b>Culturally-Centered Learning Dimension:</b> Gaining appreciation and understanding of game development across cultures.</p> <p>How and to what extent do educators support and develop cultural awareness in their students?</p> <p>How and to what extent do educators engage in web surfing and using web applications for developing knowledge of other cultures?</p>

These research questions will grow and develop as we engage in the actual research, but we can see the rich fields of exploration and research Globaloria provides. Most of these research questions are focused in ways that will help us contribute to the field of TPD, and will also help us rethink how to grow and develop Globaloria over the coming years.

## **6. Recommendations**

Given the rich sets of research questions in the previous section, it is necessary to think about how to best organize to begin developing research methods to answer them. The following recommendations are designed to begin this work. Additionally, we also need to plan for PY-2 and beyond.

### ***6.1 Partnerships***

- Develop strong university partnerships: university partnerships play an important role in Globaloria because researchers from different disciplines examine and explore the impact of Globaloria in schools
  - University partners may provide support systems for Globaloria schools
- Develop grant partnerships with universities: grants will provide multiple funding streams for Globaloria, as well as support the needs of tenure track research faculty
- Develop university/school partnerships to support research and implementation
  - This type of partnership is already well established in some parts of West Virginia, so the basic framework exists to develop this model further
- Develop Globaloria research fellowships for university faculty and other educators
  - Include doctoral and perhaps masters students
  - Semester-long or year-long fellowships would allow researchers to delve more deeply into important research areas and have the time to develop refereed articles and conference papers
  - Establish a guest speaker series where researchers, educators and students have the opportunity to present their work to Globaloria participants and to parents of students in participating schools
- Develop community partnerships with local businesses, schools and university partners that draw from community wisdom and expertise in supporting teachers and students in Globaloria

### ***6.2 Distributed Research Design***

- Develop and use digital media to establish norms of collaboration and partnerships between researchers across institutions
  - Establish norms and a culture of providing feedback and critique to researchers
- Develop and establish norms of sharing work, providing feedback and participation in cross-institution research projects
- Develop a research mapping system that uses the TDEL model presented in this paper to help Globaloria and its research partners what areas of research we have covered well, and what areas need more research

- Establish regular research meetings for all researchers to discuss and develop the overall research model
- Develop a researchers' wiki to provide a community space where all research-in-progress abstracts, conference papers and publications are kept for easy reference
- Use Webex or other synchronous video and audio media to develop a guest speaker series of expert scholars to enrich Globaloria research
- Use digital media to “highlight” Globaloria research partners on a rotating basis so that all researches are included
- Partner evaluation research with empirical research whenever possible so that neither is privileged over the other
- Encourage researchers to share their work in popular culture venues as well as academic journals.
  - Edutopia, Education Week, etc.

### ***6.3 Teacher Professional Development Local and Global***

- Develop and encourage teacher-led workshops or tutorials developed by participating teachers that can be shared across school systems
  - Value teacher wisdom: Capture “hallway conversations” that teachers use to share ideas and teach each other tips and tricks
- Keep the overall research model and agenda up front and public to teachers and students
- Encourage teacher and student participation in research, and to develop research ideas
- Encourage individual teacher action research projects as well as partnering with other teachers and university partners
- Encourage and support teachers and schools to apply for grants that support Globaloria research
- Encourage teacher/student/community research partnerships
- Encourage and develop norms of feedback and critique of action research projects

The recommendation list could go on, and will develop further over time. However, the important themes are listed: encourage educators to be learners, to develop knowledge that enriches their teaching from a variety of resources, to develop community and collaboration, and to develop norms of assessment that provide effective support to all Globaloria participants. We all need to work together to figure out the big lessons learned from Globaloria, and to build new models of TPD that can be scaled up and used in many learning contexts.

## **Appendix A Methods for Measuring Educators' Contemporary Learning Abilities**

In our survey research, we have to-date focused on two variable domains for the CLAs: 1) motivation (confidence and enjoyment in certain activities) and 2) frequency (how often). We chose these two variable domains because according to Deci and Ryan (2000), motivation represents an affective (emotionally-oriented) disposition to engage the 6CLAs. In contrast, frequency represents a more behavioral (activity-based) disposition to engage in the 6CLAs. Therefore, for the motivation items, we applied these scholars' instruments and measures towards our students' engagement in the 6CLAs. For Frequency items, we applied the same media use operationalizations employed by the Pew Internet and American Life Project in the majority of their national surveys of media and technology use. For this exploratory study, we are still piloting our instruments and items, and identifying the most relevant activities and item operationalizations to measure based on our 6CLAs model.

### *Knowledge*

We decided in Pilot-Year-1 to rely on our qualitative data analysis to cover a third variable domain of priority for us – knowledge. While some national organizations such as ISTE and the American Library Association have developed technology and information literacy / knowledge assessments, as of now, no standardized technology knowledge test exists to assess and evaluate knowledge reflecting the full range of the six contemporary learning abilities (6CLAs) for 21<sup>st</sup> Century learning for teachers. Standardized knowledge test development requires a complicated statistical process involving representative samples, and a high number of participants, in order to validate measures and items, which are analyzed in reference to actual performance to establish measure validity. Our organization did not set out to do this in Pilot-Year-1, but given the science and research-based requirements for measuring teacher effectiveness in the No Child Left Behind Act (United States Department of Education, 2002), this is an important area to pursue in future years.

### *Measuring Frequency of Engagement in Activities Representing the 6CLAs*

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 throughout history. Our surveys measured educators' frequency of technology use across the 6CLAs, both at home, and in the context of the Globaloria program at school. Increases in technology use at school due to Globaloria participation are to be expected. Increases in technology use at home on educators' own time would indicate that the Globaloria program was having an impact on the way that educators 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.

In this study, frequency is measured using a 7-point Likert self-report scale on survey items asking respondents how often they participate in a wide range of activities representing the 6CLAs. This item operationalization is derived from the Pew Internet and American Life surveys of U.S. internet use.

## *Measuring Motivation Toward Engagement in Activities Representing the 6CLAs*

Our survey research also measures participants' self-reported motivation towards engaging in a given CLA, before and after their participation in Globaloria. Motivation is a widely studied construct with a long history in the psychology literature. Central to much of this literature has been the self-determination theory work of Deci and Ryan (2000) and Ryan and Deci (e.g., 2000a, 2000b). Of self-determination theory, Brophy (1998) suggests: "The prototype of self-determined behavior is *intrinsically motivated action* that entails curiosity, exploration, spontaneity, and interest in one's surroundings. We engage in intrinsically motivated actions because we want to." In this theory, motivation is experienced *towards* various behaviors and activities, and the research of Deci and Ryan and those who have tested their theory in many contexts over decades has established the validity of intrinsic motivational instruments, in which intrinsic motivation is operationalized in its most distilled form as the variable of interest / enjoyment. The presence of interest / enjoyment has been found to predict a predisposition of repeated engagement in activities into the future, and an affective preference toward the activity.

Ryan and Deci's self-determination theory and research backing up the theory have found that intrinsically-motivated behavior requires self-determination, and self-determination is comprised of one's feelings of perceived competence (i.e., confidence), autonomy (i.e., freedom and choice), and social relatedness (i.e., feelings of connectedness and sharing with others). These three qualities are inherent in the individual, but can also be supported by the environment. Reynolds (2008) points out that these are key qualities that Constructionist environments also seek to cultivate and support in individuals through engagement in project-based work using tools such as technology for creation. Therefore we also include perceived competence (confidence) in measuring motivation.

Motivation is measured using a 5-point Likert scale on survey items asking respondents how true a set of statements regarding their confidence and enjoyment in the activities reflecting the 6CLAs is for them personally. In this study, we developed a composite for motivation by measuring participants' enjoyment in a set of technology activities, and their confidence in the activities. Our current data analysis combines the two variables of confidence and enjoyment into a single variable we label simply as "motivation."

If educator frequency of engagement in the 6CLAs increases, then it can be said to indicate the possibility of an increase in knowledge because continued and increased engagement is a necessary condition for learning. If educators' motivation is enhanced for the activities reflecting the 6CLAs, it suggests that their participation in Globaloria has enhanced their self-confidence in engaging in activities representing the given 21<sup>st</sup> Century learning ability set, and their enjoyment of engaging in it. Frequency of engagement and motivation indicate an increased predisposition and likelihood to continue engaging in the activities moving forward, and an increased likelihood that knowledge increases in these ability categories is occurring as well.

## **Educator Backgrounds, Technology Experience**

The Educators in the Globaloria program covered a broad range of age, gender, prior personal background with technology and prior support of students' technology use.

### *Demographics*

A total of 21 educators participated in Globaloria-WV in year one, with 19 completing the Pre-Program Survey and 14 completing the Post-Program Survey. The mean age of the educators was 42 (SD=13.3).

Educators report an average of 313.13 minutes per week of class time (5.22 hours) dedicated to Globaloria (SD=169.22). They report spending an additional 102.50 minutes per week of additional time outside of class (1.71 hours) towards Globaloria projects and support of their students.

The following figure displays educators' prior experience using social networking and other tools required by Globaloria.

<b>2. Before Globaloria, have you ever:</b>		
	<b>Yes</b>	<b>No</b>
Used a wiki?	23.8% (5)	<b>76.2% (16)</b>
Used a blog?	42.9% (9)	<b>57.1% (12)</b>
Designed graphics on a computer?	<b>52.4% (11)</b>	47.6% (10)
Thought up a concept for an interactive game?	38.1% (8)	<b>61.9% (13)</b>
Created a plan and timeline for completing a digital design project?	42.1% (8)	<b>57.9% (11)</b>
Designed an interactive game in Flash?	10.0% (2)	<b>90.0% (18)</b>
Done any computer programming?	45.0% (9)	<b>55.0% (11)</b>
Posted creative files like graphics, animations or games, to the internet?	<b>52.4% (11)</b>	47.6% (10)
Worked in a team on a digital design project, face-to-face?	33.3% (7)	<b>66.7% (14)</b>
Worked in a team on a digital design project, online?	19.0% (4)	<b>81.0% (17)</b>

**Figure 7 Educator Prior Technology Experiences**

Over half of the educators who participated in PY-1 had little or no experience with the social networking, designing tools or pedagogical experience working on a digital design project.

## **Appendix B Educator Case: Self-Reported Personal Progress of Educators in Pilot Year-1**

This section briefly highlights the implementation context for educators at the 7 pilot locations in the Globaloria-WV project, discussing how the educators decided to apply the Globaloria learning formula in their unique setting. See Appendix A for two tables presenting implementation details for each pilot location and educator.

For each case, we include transcribed comments provided to us by the educator participant, across the entire Pilot Year-1. The purpose of presenting these comments across time is to highlight the self-reported personal progress of the educator as she participated in Globaloria-WV. The comments in this section are sourced from pre-program surveys, and progress updates from their Stipend Reports provided to us in December 2007, March 2008, and June 2008.

We provide an example case from one educator in this section to demonstrate the rich data and research potential for the data gathered in PY-1. Additionally, we conclude this section with the aggregated comments from all educators sourced from their *post*-program surveys, reflecting their final thoughts about participation in the program in Pilot Year-1. For instance, one question includes, “What are some things that you learned this year through your participation in Globaloria that you feel might have benefited you?” We present results for the post-program survey in aggregate in this way, in order to present the range of responses for each question.

### **Randolph Technical Center, Elkins, WV:**

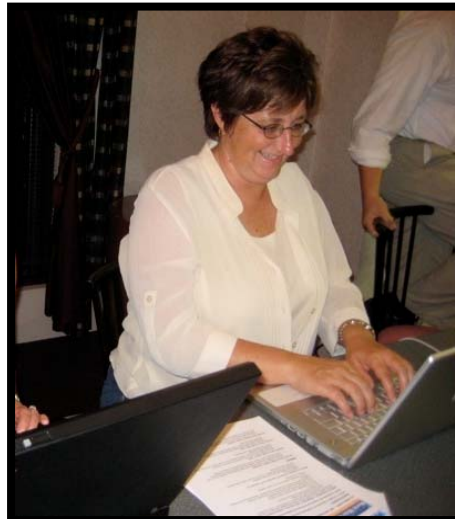
At RTC, the educators chose to offer Globaloria in the form of an elective course for credit, during school hours. The course was called “Game Design –I.” No high school classes about game design, Web 2.0 activities, or social networking had ever been offered at RTC prior to the launch of this course. The course was offered to all RTC high school students in grades 9-12 across a range of specializations. A total of 20 students opted to enroll, with 1 dropping the class because he transferred to another school. RTC received the initial core curriculum syllabus in a Word document on August 23, two days after the first educator workshop, and launched the class on September 4, spending the first two weeks working on Flash tutorials and other introductory activities outlined in the document. Further details on the content and material of these syllabus topics are included in Report #2, (Reynolds & Harel Caperton, 2008, in progress), and the syllabus content and assignments itself can be found online at:

<http://www.myglife.org/usa/wv/rtcwvWiki/index.php/Syllabus>

The RTC Starter Kit Website and Wiki platform was launched on September 14th. RTC students began accessing and using the platform on September 17th.

The class met Monday through Friday, for a 90-minute session per day, from September 4, 2007 - January 15, 2008, culminating in a total of 17 weeks (excluding holidays), and approximately 128 hours of in-class work time. On January 15, students completed their requirements and made Final Presentations with the World Wide Workshop in attendance. Students were given a week after the presentations to revise their game final projects and post them to the Wiki. Grades were issued shortly thereafter.

**Mrs. DS, 46 years old, Business Educator**



**Mrs. DS, Educator, RTC**

*Pre-Program Survey, 9/26/07*

I was born in a very small town and went to the same school 1-12 grade. I was the first person in my family to get a college education. Since then 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. I love being involved with my kids and their activities and the rest of my family. I enjoy sports, reading, crafts and walking.

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.

**What motivated you to participate in Globaloria?**

My students frequently discuss gaming and my son is very involved in gaming. I want to be able to offer them something they enjoy but can also do as a career.

**What do you hope and expect to achieve in the program?**

My students and I learn skills which would not have been able to learn without the program.

**What are your initial ideas for an interactive game?**

I have several ideas. One would be to find the hidden treasure in different places in Randolph County. Players must answer a question or solve a problem to get a clue to find the treasure. Each time they get treasure they get points. Try to get the most points. Use places know to the student.

In discussing her background in business education at RTC, Mrs. DS stated that she started out teaching keyboarding “which got boring really quickly,” so she asked to learn more and teach more advanced classes. She stated that previously she also helped write the state content standards for digital imaging and web design classes, and that RTC was the first school in WV to add these courses to the business department, also gaining funds for a computer lab area that includes digital imaging, desktop publishing, web page design and business computer applications.

Out of all the high school and middle school educators in Pilot Year-1, Mrs. DS expressed the most initiative and enthusiasm to participate in the Globaloria program, in her communications with our producers and her engagement in the program overall. Prior to Globaloria, Mrs. DS reports in the Pre-Program Survey that she had never before used a Wiki, engaged in game design, or worked in a design team online. She self-reports little prior understanding of social network sites or online gaming, some understanding of Flash and Actionscript, and a greater extent of understanding for software, hardware, blogs and graphic design.

Mrs. DS states that most of her training was "Learn it while you teach it." At the same time, she has attended conferences and workshops along the way, and her principal paid for her to take an online basic Adobe training. She also states that she enjoys learning from her students. Several times in our communications Mrs. DS discussed the extent to which students taught her new Flash skills in Globaloria, and that in her class, they all learned as a team together. In addition to many of her students, Mrs. DS herself was a model learner in our program.

Throughout Pilot-Year-1, Mrs. DS did a significant amount of self-learning of Flash 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. She created her own game, and took an active role in the educator trainings we ran. Mrs. DS created her own profile page on the Wiki, and posted her game files online along with those of her students. Her Flash game 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, d) singlenet." Her game features a few simple static graphics, including the following screen, and a few instances of layered objects and text flying in across the screen.



7.1

# Question 1

1. A network that is used by a single organization and is NOT accessible from the outside is a(n)  
(2.4)

A. internet	B. ethernet.
C. intranet	D. singlenet.

Score

7.2

# Yeah--Next Question

Click for next question

2

7.3



Flipping for joy you got the right answer

Next

7.4

Figure 9. Mrs. DS's Flash game

### *Personal Progress Report, December*

My skills in Flash have more than doubled/tripled. I can add sound, shape tweening, and have a better understanding of actionscript. I have learned more from my students then they have learned from me. I am the person who is facilitating this course and in a sense being a project manager to make sure they stay on task and complete work.

One of the major technical challenges for us has been receiving and installing the software. I have been a computer teacher for a number of years now so this just comes with the job. No matter what, there is always some issue. Learning to be flexible and not so structured has to be part of working in a computer lab.

The major accomplishment is that we were able to offer this course for high school credit. Over the last few years our center has tried to encourage students to advance their technology skills. We have one of the few Mac labs in the state. We offer web page design, digital imaging, desktop publishing, etc. Adding this course is just another step in an ongoing process for us to keep our students "ahead of the game" when going into the workforce or post graduate training.

When I see the products the students have produced I see success. Several groups have a good, solid start to an educational game. Several students have indicated a desire to continue next semester and are willing to change their schedules to continue.

It is challenging being a MyGLife educator because I can not keep up with the tutorials as fast as the students. In addition to my regular teaching position I am teaching two additional nights per week and taking a class another night. My two kids are involved in band, clubs, cross country and swimming. (Maybe I didn't have time to do this. HaHa)

### *Personal Progress Report, March*

- I had to change my game idea because of time but I used questions from a practice test that I use to review for end-of-course tests with my students. I was able to add coding for scoring, animation and buttons that linked to other frames. I learned that it is extremely time consuming. I worked with Patrick Smith at the workshop to start an xml file that would be better suited to do the game but we ran out of time. Since this semester has started I have not been able to set aside enough time to learn it on my own. Link to my game [http://www.myglife.org/usa/wv/rtcwvwiki/index.php/Final\\_Games](http://www.myglife.org/usa/wv/rtcwvwiki/index.php/Final_Games)
- These are the tutorials that I have completed:
- Working with Text in Flash
- Prepare your own photos for the Jigsaw puzzle
- Flash: Drawing Tools
- Symbols, Buttons
- Frame by Frame Animation
- Motion Tweening
- As my students work and ask me to help them solve problems I have learned a great deal. I know how to do some different coding by copying from sites then editing.

### *Personal Progress Report, June*

I worked less on a game this time and became the motivator for the Game Design II class. I tried to keep them focused and on a schedule to reach their goal of finishing a game. I learned more about behaviors and music. Watching and helping Kris convert his music into files that were small enough for the game was a learning experience for me.

### *Summary of Findings, Denise Stalnaker*

The data available from the educator experience is rich and holds much promise for empirical research over the course of the next year. The following section presents findings that describe educators' progress developing the six Contemporary Learning Abilities.

## Appendix C Globaloria Educators' Increases in Six Contemporary Learning Abilities as a Result of Participation in the Globaloria Program

Table 7 that follows presents data for Educators' frequency of and motivation toward activities reflecting the 6 contemporary learning abilities. Pre-test data were collected on October 4, 2007<sup>9</sup>, and post-test data were collected after all groups completed their Globaloria participation, in early June, 2008. The variables for the pre- and post-program survey reflected in the tables below were combined additively for the activities items reflecting each CLA. The chart presents the mean for educators on their engagement in these activities, prior and subsequent to participating in Globaloria.

While the framework we currently employ involves only 6 Contemporary Learning Abilities, when we conducted factor analysis, we discovered more than 6 distinct "types" of activities. That is, for instance, CLA 6 is termed "Surfing," and theoretically encompasses gameplay of online games. However, our factor analysis findings indicated that in fact, while items reflecting web surfing activity hung together in the analysis, items reflecting gameplay were distinct from general web surfing. Therefore, when we combined variables we split the "Surfing" CLA into surfing specifically, and gameplay specifically. We used the same approach for the variable "Project-based learning and project management" below, which is split into creation of digital artifacts, and teamwork in online environments. Our Factor Analysis findings indicate that in fact, from a data analytics perspective, these are two distinct activities and thus they were separated into two categories when we were combining items in the data set. These alterations are reflected in the tables below.

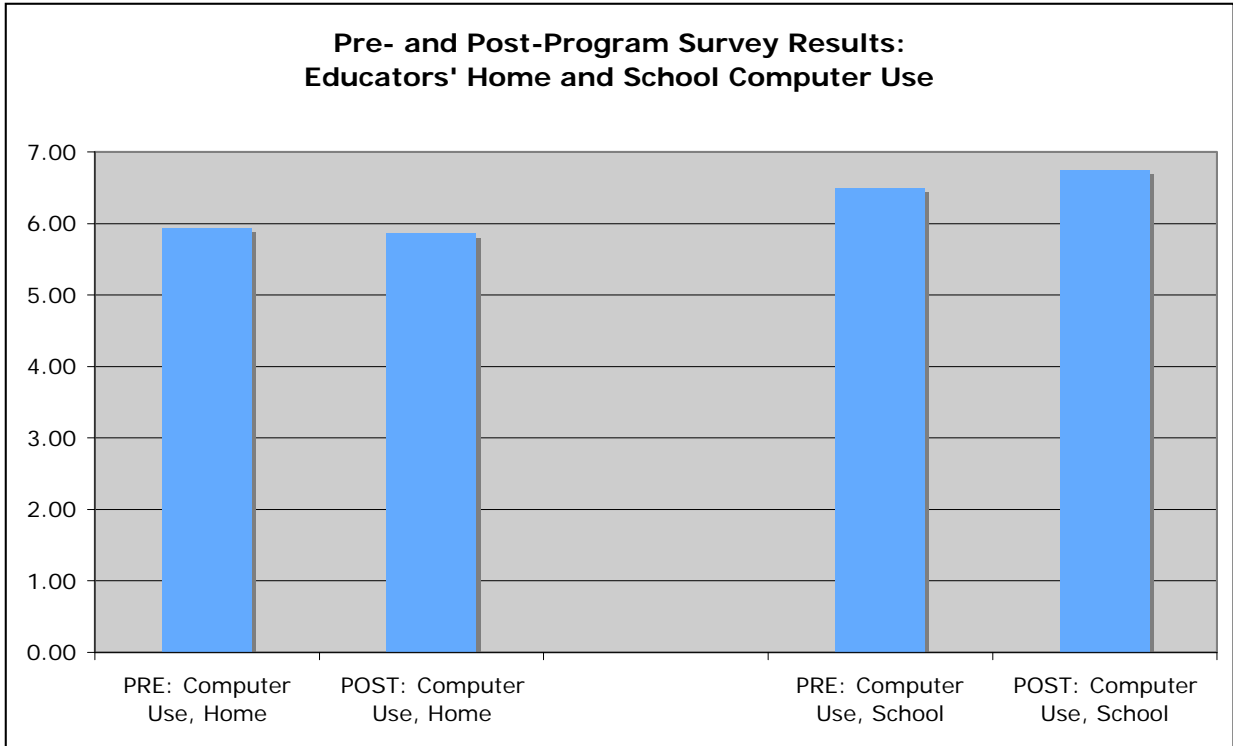
In this section, we present aggregate results of the quantitative analysis we conducted of the Pre- and Post-Program Survey, for the group of educators in Globaloria, Pilot Year-1. The results that follow in Table 7 present Paired T-Test statistical analytic findings of Globaloria educators' frequency and motivation for a range of activities that cultivate the 6CLAs, representing changes in scores for the educator sample from Pre- to Post-Program Survey. The total educator N of this study was 14.

**Table 7 Increases in Educators' Frequency and Motivations for Engaging in Activities Reflecting the 6CLAs**

	Frequency (7-point scale)	Motivation (5-point scale):
CLA 6: Surfing (Surfing for information)	<i>Increased, 4.8 to 6.0*</i> <i>t(12) = -2.31</i>	Not asked
(Surfing for gameplay)	Slight decrease, 2.7 to 2.5	Increase, 3.14 to 3.8

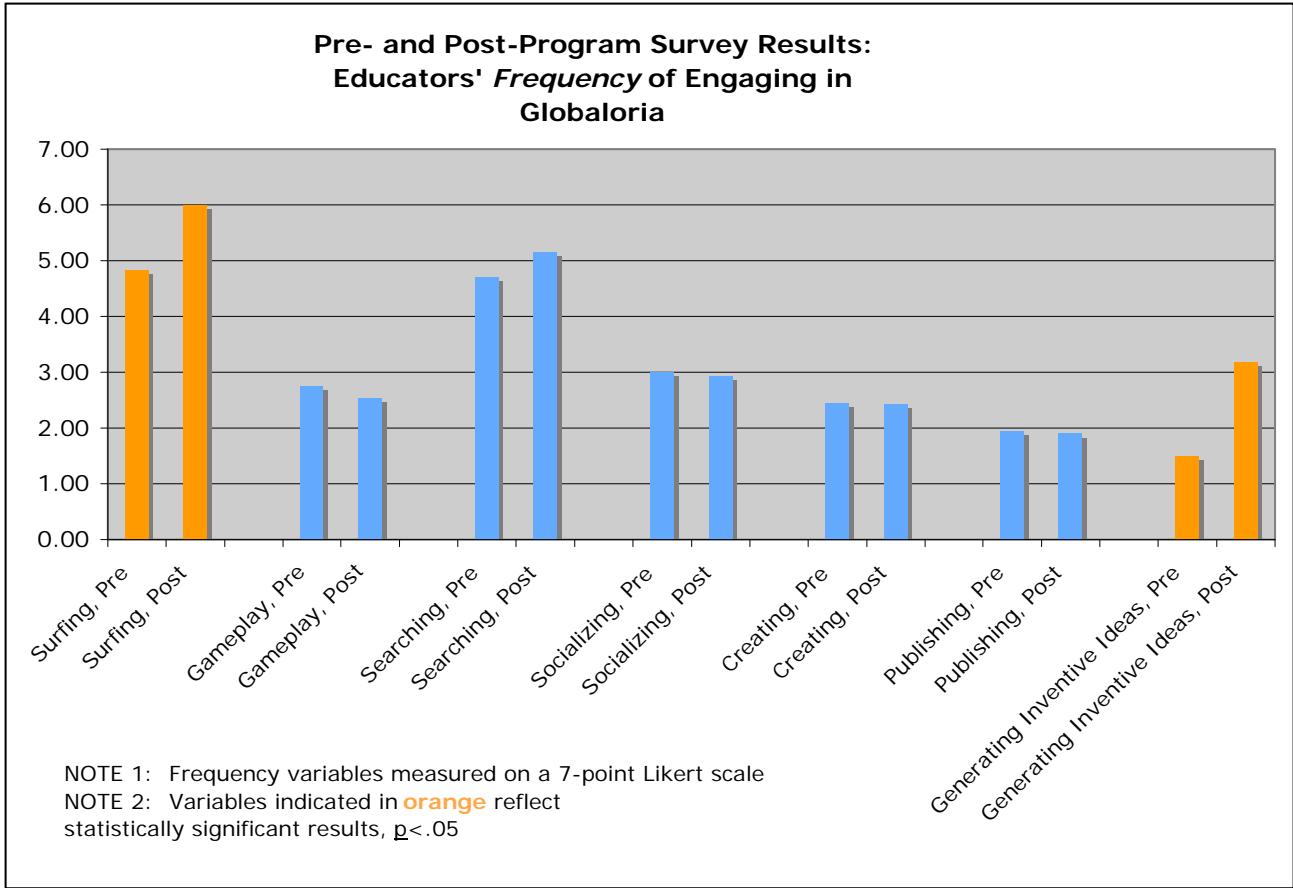
	<b>Frequency (7-point scale)</b>	<b>Motivation (5-point scale):</b>
CLA 5: Information-seeking	Increased, 4.7 to 5.1	<i>Increased, 2.9 to 4.7***</i> <i>t(12)= -4.22</i>
CLA 4: Socializing and communicating online	Slight decrease, 3.0 to 2.9	Not asked
CLA 3: Publishing and distribution of digital media	Remained static, 1.9 to 1.9	<i>Increased, 2.8 to 6.2 ***</i> <i>t(12)= -6.87</i>
CLA 2: Project-based learning, project mgmt. (Creating with digital media)	Remained static, 2.4 to 2.4	<i>Increased, 2.7 to 3.2**</i> <i>t(13)= -3.72</i>
(Collaborating with team members online)	Not asked	Increased, 3.0 to 3.5
CLA 1: Generating of project ideas	<i>Increased, 1.5 to 3.2***</i> <i>t(13)= -4.22</i>	<i>Increased, 3.0 to 3.3**</i> <i>t(12)= -2.18</i>
* p<.05 ** p<.01 *** p<.001		

The findings in this table demonstrate that educators' generally increased their skills and usage of the CLAs about which they were asked. This is good news, given that most had little to no experience with these learning abilities at the beginning of the project and school year.



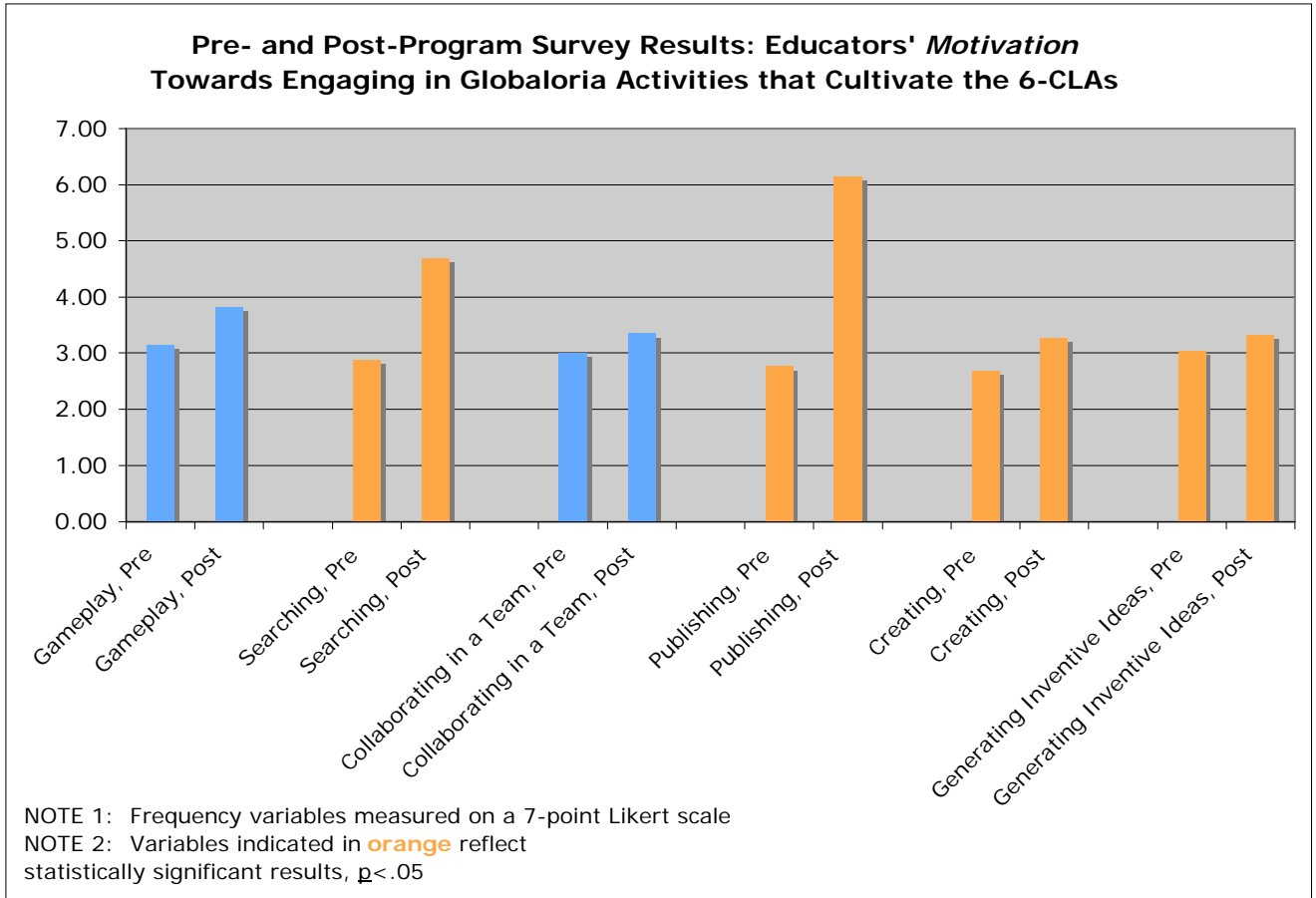
**Pre- and Post-Usage Data**

This graph highlights an increase in computer use at school, and a decrease in computer use at home. Further research will clarify why this is so, and whether this is a significant shift.



**Figure 8 Frequency of Engagement**

This graph reveals the work and research that is key to sustaining Globaloria—while educators significantly increased the amount of web surfing they do, and the amount of using the web to generate inventive ideas, they did not increase in publishing digital media or sustain their usage of social networking and community building tools. This is not a new problem in terms of developing a sustainable professional learning community, but it must be addressed.



**Figure 9 Educator Motivation**

Overall, educators felt motivated in most of the categories surveyed, however there is a distinct difference between feeling motivated and actually doing.

*Summary of Pre- and Post-Program Survey Results*

Educators indicated a statistically significant motivation to search on the web, publish, create digital media and generate inventive ideas. The Frequency of Engagement reveals that there is a gap between motivation and engagement—educators engaged in surfing and generating innovative ideas at the statistically significant level.

Overall, the PY-1 was a very successful year, rich in learning for all, and providing the groundwork for the program redesign and extended research already in progress.

## Appendix D

The following Tables 1 and 2 provide the details on each of our 21 educators from the 7 pilot locations in Globaloria-WV Pilot Year 1 in the Fall of 2007 (Table 1), and Spring of 2008 (Table 2).

The tables reflect the educators' roles in the project, grade levels, and total number of students taught in the project, and the context for the type of program offered (e.g., an after-school program, or integrated into the curriculum as a special course). The last column reflects whether student final game projects at a given pilot location in the given semester were conducted individually or in teams.

**Table 8 Educators, Semester 1, Globaloria-WV Pilot Year 1**

Pilot Location	Fall, 2007				Implementation Context		Final Game Projects: Individual or Team Work
	Location Contact Names	Role of Contact	Student Grade Levels	Total # Students	Location Type	Type of Program Offered	
Florence Crittenton Center, Wheeling	Heidi Fitzpatrick	Educator	MS, HS	5 (1 MS, 4 HS)	Alternative Education	After School Program, 2 mtgs/week, 2 hours/mtg	Individual
	Jan Bragg	Educator					
Man HS (HSTA), Man	Jenny Bardwell	Administrator					
	Tonia Ward	Educator	HS	5	Typical Public High School	After School Program, 2 mtgs/week, 2 hours/mtg	Individual
Capital HS (HSTA), Charleston	William "Bill" Dorsey	Educator	HS	11	Typical Public High School	After School Program, 2 mtgs/week, 2 hours/mtg	Individual
	Parween Qazi	Co-Educator (75%)					
Randolph Technical Center, Elkins	Denise Stalnaker	Educator	HS	20	Technical/Vocational Education	New course, for credit, 1", 5 mtgs/week, 90 mins/mtg.	Both
	Paula Heinke	Educator (part-time)					
Clay County Schools, Clay	Cindy Willis	Administrator	HS	6	Typical Public MS and HS	After School Program, 2 mtgs/week, 2 hours/mtg	Individual
	Jared Fitzwater	Educator	MS	8			
	Warren Mullins	Educator					
Marshall Community & Technical College, Huntington	Patrick Smith	Educator	Jr. College	12 total (4 of 12 incomplete)	Technical/Vocational Education	New course, for credit, 1", 4 mtgs/week, 2 hours/mtg.	Individual
	Randall Jones	Educator					

**Table 9 Educators, Semester 2, Globaloria-WV Pilot Year 1 (blue shading represents changes from previous semester)**

Pilot Location	Spring, 2008				Implementation Context	
	Location Contact Names	Role of Contact	Student Grade Levels	Total # Students	Type of Program Offered	Individual or Team Work
Florence Crittenton Center for Girls, Wheeling	Heidi Fitzpatrick	Educator	MS, HS	6 (1 MS, 4 HS)	After School Program, 2 mtgs/week, 2 hrs/mtg	Team
	Megan McGee	Educator				
HSTA Man High School (HSTA), Man	Jenny Bardwell	Administrator		5	After School Program, 2 mtgs/week, 2 hrs/mtg	Team
	Tonia Ward	Educator	HS			
	Loretta Mullins					
Capital High School (HSTA), Charleston	William "Bill" Dorsey	Educator	HS	7	After School Program, 2 mtgs/week, 2 hrs/mtg	Team
	Parween Qazi	Co-Educator (75%)				
Randolph Technical Center, Elkins	Denise Stalnak	Educator	HS	5	New course, for credit, during school hours: "Independent Study: Intro to Game Design, 2", 5 mtgs/week, 90 mins/mtg.	Team
		Educator (very part-time)				
Clay County Schools, Clay	Cindy Willis	Administrator	MS, HS	5	HS Students: New course, for credit, during school hours: "Intro to Game Design, 1", 5 mtgs/week, 40 mins/mtg MS Students: After School Program, 2 mtgs/week, 2 hrs/mtg	Individual
	Jared Fitzwater	Educator		9		Individual
	Randy Cantrell	Educator				
Marshall Comm. and Technical College,	Patrick Smith	Educator	Community College	8	Integrated "Intro to Game Design, 1" class offered for credit, 4 mtgs/week, 2 hrs/mtg	Team
	Randall "Randy" Jones	Educator				
Kasson MS, Kasson	Chad Gray	Educator	MS	12	Integrated into computer skills class, 5 mtgs/week, 40 hrs/mtg	Team
	Michelle Barb	Educator				
	Jill Schiefelbein	Co-Educator				
	Carolyn Spessert	Co-Educator				
	Susan Anglin	Co-Educator				

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