Designing Digital Experiences for Positive Youth Development
From Playpen to Playground

Marina Umaschi Bers
Think of a nine year old. She wakes up in the morning and after breakfast goes to school. She spends most of the day learning new things and socializing with peers. During recess, she plays outside. Not only does she explore the space and experiment with the objects she finds, as she did in her preschool years, but she also organizes and participates in games. Those games require her to learn rules and engage in social negotiations. She tries to get better at the games every time she plays. There are winners and losers. She is starting to realize that she needs to work hard to get what she really wants. When she comes back home, she participates in after-school activities: soccer, piano, gymnastics, math club, and so on. She has homework, and she has to study for tests. She is learning how to manage her time. She is also learning how to set her own play dates to spend time with friends.

Although the length of the school day and the after-school activities might be different, most children in the elementary school years spend their time learning how to master new skills—academic, physical, and social. Erikson describes this stage of development as *industry vs. inferiority*. A child is capable of working hard to accomplish new skills—successfully solve a math problem, score a goal in a soccer game, or invite a friend for a play date. But she might also feel that she is not as good as her classmates in some or all of these tasks. She starts to compare herself with others, she notices disparities in abilities to achieve, and feelings of inadequacy and low self-esteem may arise. When the tension is successfully solved, the resulting virtue is a strong sense of competence.

In this chapter I am proposing the park as a space for the development of competencies. Most children in elementary school enjoy going to the park. In contrast with the fenced playgrounds of the preschool years, parks
are big spaces that allow children to engage in many different activities. There are the traditional play structures such as swings, slides, and sandboxes, but there are also basketball courts, paved roads for biking or scootering, woods for hiking, and open fields for baseball or soccer. There are tables and benches for doing homework or having a picnic and lots of space to walk around. Although in some cases adults walk or drive children to the park, the interactions with the adult don't matter as much as the interactions with peers. At the park children choose their favorite activities; they develop and master skills and engage socially with peers. From a developmental perspective, parks offer opportunities for gaining competence beyond academic disciplines.

Now think of a mall. We find elementary school children who choose to go to the mall with their friends—particularly those children in the older grades. Parents drop them off at the mall entrance and pick them up two hours later or stay with them. Children walk around the mall and look at shops; they might even try on some clothes and sit for a snack at the food court. They can decide how to spend their money and can choose which stores to go into and which ones to ignore. Children are bombarded with commercial advertising. The mall, beyond exposing children to the fundamentals of capitalism, doesn't offer as many opportunities for building competence and mastery, the fundamental developmental tasks at this age, as the park does. Don't take me wrong. Malls can serve a positive function. One goes to the mall to buy something or to walk protected from inclement weather. However, in this chapter, malls are presented as spaces that might serve a developmental function.

Both parks and malls are metaphors for looking at digital landscapes in the elementary school years. While parks offer opportunities for gaining mastery and competence—the fundamental developmental milestones at this stage—malls don't. Malls are spaces for consumption, as opposed to creation. This metaphor holds when taken to the digital world. While some Web sites, video games, programming languages, and virtual worlds engage children in becoming fluent with technology and learning new skills, others merely expose them to sound, color, and animation, as well as multiple ads. Some technologies invite children to create their own projects and demand an investment of time and effort to learn the needed skills. Whereas others provide quick gratification, by having children consume what others have created.

Mitchel Resnick, from the MIT Media Laboratory, writes about “pianos, not stereos”:

The stereo has many attractions: it is easier to play and it provides immediate access to a wide range of music. But “ease of use” should not be the only criterion.
Playing the piano can be a much richer experience. By learning to play the piano, you -can become a creator (not just a consumer) of music, expressing yourself musically in ever-more complex ways. As a result, you can develop a much deeper relationship with (and deeper understanding of) music.

(Resnick, Bruckman, & Martin, 1996, p. 41)

A child who learns how to play the piano is engaging in one of the essential developmental tasks for the elementary school years: mastering new skills. Of course, there is a time and place for listening to good music on a stereo (or an iPod), just as there is a time and place for going shopping at the mall. These are all metaphors that highlight the potential role of the child as a consumer or as a producer.

The “pianos, not stereos” motto conveys the idea of the child as producer. However, it limits the domain of mastery to what those particular objects can offer. A space metaphor, instead, opens up the game. A space can house many objects and invite many interactions, so children can experiment with different domains of mastery. Not all children enjoy or are good at music, and not all can or want to invest the energy and effort needed to skillfully play the piano. The park, instead, offers multiple opportunities. A child can play organized sports on the basketball court or the baseball field. She can freely explore the area and become an expert hiker. She can bike around the paths. She can engage in conversations with peers and work at mastering social skills. She can sit on the benches and do homework. The possibilities are endless. The child can choose a domain and master it. And then, she can move on and try a new domain. The park offers, in the words of Sherry Turkle and Seymour Papert (1992), the possibility for “epistemological pluralism,” a diversity of new ideas, new ways of knowing, and new approaches to problem solving.

This book looks at technology as a developmental space, not as an object or tool to accomplish a task. However, not all spaces are the same; nor do they afford similar opportunities for personal growth. The multimedia park metaphor, as opposed to the virtual mall, highlights that technologies in the elementary school years should provide opportunities for playful mastery and competence—the virtues identified by Erikson as essential for this stage of development.

This is aligned with the fundamental principle of Constructionism that we visited in an earlier chapter. Constructionist learning environments provide tools for children to become designers and creators of their own projects. Children become producers, as opposed to consumers of content. They can apply concepts, skills, and strategies to solve authentic problems. This philosophy is shared with approaches such as “learning by designing” (Kolodner, Crismond, Gray, Holbrook, & Puntamhekar, 1998),
"knowledge as design" (Perkins, 1986), and "design education" (Ritchie, 1995). In constructionist learning environments children create projects that are, first, personally relevant. Children are invested in making them. They care about them; they are interested in them. Second, the projects are epistemologically relevant. Children learn about a particular domain of knowledge and explore powerful ideas in this area. And, third, they are sharable. Children can show them and talk about them with a community.

There is a long tradition of constructionist learning environments focused on exposing children to the domain of computer science. Environments such as Logo and Scratch engage children in learning computer programming, either as an epistemologically relevant domain to master for its own sake or as a way to master other domains of knowledge. For example, a child can learn Logo and master the computational concepts of recursion and variables. But she can also apply those concepts to learn geometry while programming the Logo turtle to make squares of different sizes and colors. A child can animate a character using Scratch and learn about computational control structures but can also use those concepts to create an interactive story with all of the structural components of a well-formed narrative.

Programming environments are spaces. The results of the activities that happen in those spaces are objects—virtual or tangible. Although the constructionist literature hasn't explicitly focused on the developmental milestones that children could achieve in those spaces, the emphasis has always been on mastery and competence. Papert coined the term *technological fluency* (Papert & Resnick, 1995), which refers to the ability to use and apply technology in a fluent way, effortlessly and smoothly, as one does with language. For example, a technologically fluent person can use technology to write a story, make a drawing, model a complex simulation, or program a robotic creature. As with learning a second language, fluency takes time to achieve and requires hard work and motivation. In order to gain technological fluency, one should first master basic skills and achieve technological literacy (Bers, 2008a).

Technological literacy has sometimes come to be known as "computer literacy" and has a long history. It refers to the ability to use computer applications, such as a spreadsheet and a word processor, and to search the Internet for information. The Partnership for 21st Century Skills (http://www.21stcenturyskills.org) describes several skills that children need to learn "to succeed as effective citizens and leaders in the 21st century, such as using digital technology, communication tools and/or networks appropriately to access, manage, integrate, evaluate, and create information in order to function in a knowledge economy" (2007).
However, skills with specific computer applications are necessary but not sufficient for individuals to prosper in the Information Age, when new skills are constantly needed, applications change rapidly, and new tools require new skills.

Programming environments provide a venue to help children develop technological fluency. But other digital spaces might also achieve this goal: For example, some video games and virtual worlds offer opportunities for children to become producers, and not only consumers of digital materials.

In 2010, according to a study of 1,200 households by the Entertainment Software Association (ESA), 67% of American households played video games, 64% of parents believed that games are a positive part of their children’s lives, and 48% of parents played video games with their kids at least once per week. The term video games, as it is used here, refers to software, supported by any type of computer, console, or mobile or virtual platform that involves interaction with a user interface to generate visual feedback on any display by manipulating an input device, such as a game controller, joystick, keyboard, or mouse.

Games are goal-directed and competitive activities conducted within a framework of agreed rules. This ample definition makes room for different genres of games: ludic games, in which players win by taking action and developing strategies; narrative games, in which players solve conflicts by choosing different paths of action; and simulations, in which players can observe emerging behavior patterns to understand how a particular system functions in different circumstances. Playing games might involve racing, solving puzzles, doing sports, engaging in action and adventure, playing with rhythm and music, developing strategies, participating in simulations, fighting, first-person shooting, or role-playing. As of 2009, the best-selling video games were sport games (19.6%) and action games (19.5%), followed by family entertainment (15.3%) and shooter games (12.2% [ESA, 2010]). The top games sold for families were Super Mario Bros., several Wii games such as Wii Play* and Wii Sports*, The Sims, and World of Warcraft (ESA, 2010). Some of the most popular games for children are music games such as Guitar Hero* and Rock Band*. These games provide opportunities for children to experience music, by making it. Thus, using Resnick’s terms, they can be thought of as “pianos, not stereos.”

A 2010 nationally representative survey of 2,002 third–12th grade students done by the Kaiser Family Foundation on children’s media use found a significant increase in video gaming over the past 10 years, from an average of 26 minutes daily in 1999 to 49 minutes in 2004 and 73 minutes in 2009. According to the Kaiser Report (2010), this increase appears
to be largely a function of the growing use of handheld devices for game playing. On any given day, 60% of young people play video games and spend an average of one hour and 13 minutes at it. Video game playing peaks among 11- to 14-year-olds, especially for console playing. The Kaiser Report (2010) found that just as children begin to make the transition into adolescence, their media use explodes.

There remains a substantial difference between boys and girls in console video game playing, with boys spending an average of almost an hour a day playing and girls just under 15 minutes. However, contrary to the public perception that media use displaces physical activity, young people who are the heaviest media users report spending similar amounts of time exercising or being physically active as other young people their age who are not heavy media users. So, while levels of physical activity do vary by age and gender, they don't vary by time spent using media (Kaiser Report, 2010).

Only a few years ago gaming was mostly viewed, in the best-case scenario, as a waste of time and most commonly as a risky activity that might lead to antisocial behavior, aggression, and violence, as well as reinforced gender stereotypes (Grüsser, Thalemann, & Griffiths, 2007). More recently, a growing body of research is starting to focus on “serious games” that might have a positive impact on young people (Squire & the Games-to-Teach Research Team, 2003). For example, there is increasing interest and expertise in developing serious computer games for promoting health (Kato, Cole, Bradlyn, & Pollock, 2008; Lieberman, 2001), education (Gee, 2007; Shaffer, 2007), and civic engagement (Bers, 2008c).

The 2008 Pew Internet and American Life Project report found that 44% of youth play games that teach them about a problem in society, while 52% play games that engage them in thinking about moral and ethical issues. The report also suggests that youth who have these kinds of civic gaming experiences are more likely to be civically engaged in the offline world and are also more likely to go online to get information about current events, try to persuade others how to vote in an election, become committed to civic participation, and raise money for charity.

Although public debate often frames video games as either good or bad, research shows that the context in which the video games are played and the content of the video games matter more than the amount of play time. Some video games might promote pro-social behavior and cognitive problem solving, while others might hinder them. Video games offer the opportunity to bring civic education back to life by engaging young people in simulations of political processes and immersing them in experiences in which making civic-based decisions are highly rewarded (Bers, 2010c). For example, researchers such as Squire and Barab (2004) have studied...
The digital landscapes for youth

The positive learning impact of playing the historical simulation game Civilization.

Civilization was first developed in 1991 and has now been converted into a series with several sequels, such as Civilization II, Civilization III, Civilization IV, and Civilization Revolution, which present players with the goal to "build an empire to stand the test of time." The game begins in 4000 B.C., and the players attempt to expand and develop their empires through the ages by taking the role of rulers of a civilization and competing with other, already existing civilizations. For example, players need to explore far lands, judge when to engage in war or diplomacy, make decisions regarding when and where to build new cities, and decide which scientific and engineering advances can transform the cities to their maximum potential (Edwards, 2007). Later versions of this game allow for head-to-head play against other players.

Although video games might provide new opportunities for moral decision making and civic engagement, they might also obscure some of the intricacies of political decision making, which are hidden in the decisions made by game designers when conceiving game models that might be simple enough for simulations to work but do not take into consideration the complexities of political systems. Authoring kits that enable children to produce their own video games by modeling decision-making processes might yield better educational results in the long term. Once again, the child should be a producer, rather than a consumer. In this way, she has ample opportunity to develop competence as well as confidence.

Researchers such as Williams (2006a) suggest that the backdrop for the rise of social gaming is a decline in civic shared spaces for people to meet and converse face-to-face. Echoing Oldenburg's (1997) account of how third places—which are neither home nor work and cross-nationally might include social clubs, tabernas, piazzas, pubs, and public squares—are vital for community formation and maintenance, current research is showing that gaming, in particular virtual multiplayer games, might come to satisfy the human need for community and social interaction (Steinkuehler, 2006). Video game playing provides a space for social development and mastery of social relationships. Remember, Erikson. From a developmental perspective, during the elementary school years, interactions with peers become more important than those with adults. This process continues its evolution into the teenage years.

Although video games are very popular, virtual worlds are becoming the most rapidly growing third places for children in elementary school. A 2008 report published by the Association of Virtual Worlds categorizes approximately 110 virtual worlds for kids, 115 for tweens, and 140 for teens. As of the second quarter of 2008, the largest virtual world for adults
(over age 20) had 13 million registered users, while the largest for children had 90 million users (KZero Research, 2008). Virtual worlds such as Neopets (http://www.neopets.com/) are designed for children six to 12 years old. They can create their own Neopets by choosing their species, gender, and personality; set up their own shop; and feed them and look after them, as well as communicate with others, play games, and create their own Web pages. Children can also submit content for the weekly electronic newspaper called the *Neopian Times* and participate in a peer-based Neopets community. Children create artifacts and master new skills. On August 10, 2008, 237,138,604 Neopets had been created.

The eMarketer report found that of the 34.3 million U.S. child and teen Internet users, 24% in 2007, up to 34% in 2008, and 53% by 2011 visited virtual worlds once a month (Williamson, 2008). As an example of the increasing popularity of virtual worlds for children, the site Webkinz increased its visits by 1,141% in a year (Prescott, 2007), from less than one million to over six million (Tiwari, 2007). Club Penguin doubled in size, from 1.9 million to 4.7 million visitors (Shore, 2008). This popularity, however, is related to commercial endeavors. For example, Club Penguin was acquired by Disney, the popular Webkinz animals come with a code needed to enter the virtual world, and the Bratz fashion dolls are sold with a USB key-necklace so the child can unlock the Be-Bratz.com virtual world (Beals & Bers, 2009).

These commercially focused virtual worlds and malls share many similarities. Their purpose is to sell products, to engage people in consuming different types of goods. We visit them, they are fun, they provide entertainment, and they satisfy our real or imaginary needs. They might become dangerous when we do not know how to handle ourselves in those spaces, when we cannot distinguish our needs from our desires. However, they bring to the forefront the importance of educating children. At the mall, parents might give children limited money and teach them what to buy and what to avoid. They might help them to select the appropriate stores; they might slowly teach them how to behave in a mall, how to avoid dangers, and how to take advantage of the best opportunities. Probably, parents do all this educational work without realizing it. Parents themselves are familiar with the mall. However, things are different in the virtual world. Parents might have never visited one, or they might not know what the best strategies for protecting their children are. Very few are familiar with Internet safety. Although there is a myriad of approaches developed by associations and nonprofit organizations, especially concerning the commercial nature of the Internet, parents might feel that their children are more vulnerable in a virtual world than in a commercial mall. The third part of the book will discuss this.
However, not all virtual worlds for children are commercially focused. For example, ZulaWorld.com, Quest Atlantis (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005; http://atlantis.crlt.indiana.edu/), River City (Dede, Ketelhut, Clarke, Nelson, & Bowman, 2005; Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004; http://muve.gse.harvard.edu/rivercityproject/index.html), Second Life in Education (http://sleducation.wikispaces.com/), MOOSE Crossing (Bruckman, 1996; http://www.cc.gatech.edu/elc/moose-crossing/), Whyville (http://www.whyville.net/smmk/nice), 3DLearn (http://www.3dlearn.com/), Jumpstart (http://www.jumpstart.com/), and Zora (Bers, Chau, Satoh, & Beals, 2007; Bers, Gonzalez-Heydrich, & Demaso, 2001; http://ase.tufts.edu/devtech/tools.html), to name just a few, are designed with an explicit educational goal.

Are virtual worlds becoming the multimedia parks of the 21st century? If designed to support types of interactions similar to those that happen in the physical space and to promote the development of competencies, can they serve youth in a positive way? Subrahmanyam and Greenfield (2008) think so:

For today’s youth, media technologies are an important social variable and... physical and virtual worlds are psychologically connected; consequently, the virtual world serves as a playing ground for developmental issues from the physical world, such as identity.

(p. 124)

Are virtual worlds increasingly popular because they fulfill the need for spaces explicitly designed for the children in the older spectrum of the elementary years, the tween years, when issues of identity start to emerge? Sherry Turkle’s pioneer work has proposed so. Back in 1995, she studied how the Internet could provide a “social laboratory” for exploring issues of identity. In the next chapter, I will discuss the role of technology in the high school years, when children are struggling to answer the question, “Who am I?”

Both parks and virtual worlds are carefully designed. Remember the landscape designer. She purposefully chooses the materials and arranges them to support a specific aesthetic or functional goal. The digital landscape for children, composed of virtual worlds, programming environments, and computer games, must promote positive development (Beals & Bers, 2010). In the elementary school years children are struggling with *industry vs. inferiority*, and they resolve this tension in a positive way by developing a sense of competence. New technologies must provide opportunities for children to become creators of digital projects and not just...
consumers, to learn new skills, and to share them with others (Barron, 2004).

Back in 1999, as part of my doctoral work at the MIT Media Lab under the direction of Seymour Papert, I developed the Zora virtual world. Inspired by the constructionist philosophy of learning, Zora provides easy-to-use tools for children to design and inhabit a virtual city. They can populate the virtual city by making their own virtual places and interactive creations, including 3-D objects, characters, message boards, and signs, as well as movies and sounds. Zora is a 3-D multiuser environment explicitly developed to provide a safe space for youth to explore issues of identity (Bers, 2001). The name Zora was inspired by one of the imaginary cities described by Italo Calvino (1972) as a city like a honeycomb in whose cells each person can place the things she wants to remember, so the world's most wise people are those who know Zora. My goal was to provide a space where children could become wise by knowing who they are—mastering their own selves.

Zora is a research-based virtual world. It has been used since 1999 in different pilot studies with several populations of young people, including those with end-stage renal disease undergoing dialysis treatment (Bers, Gonzalez-Heydrich, & DeMaso, 2001, 2003), multicultural groups (Bers, 2001; Bers & Chau, 2006), first-year students in college (Bers; 2008c; Bers & Chau, 2010), post-transplant pediatric patients (Bers et al., 2007; Bers, Lynch, & Chau, forthcoming), pediatric cancer patients in summer camps (Cantrell & Bers, 2010), and participants in national and international after-school computer-based learning centers (Beals & Bers, 2010). The vignettes and one of the case studies presented later share experiences from some of these projects.

Virtual environments are powerful platforms for developing educational programs. The potential of these immersive environments goes beyond the four walls of the classroom (Beals & Bers, 2009). As the physical and the virtual are becoming interconnected, it is important to understand how new technologies can be designed to best serve children's developmental needs. The fast-growing uses of virtual worlds for education are consistent with a recent paradigm change in the learning sciences—a change that is shifting the process of cognition from the head of one individual to a situated practice. As technology rapidly changes, new possibilities for crafting educational programs emerge. Thus, the question is: What will not change, when everything else changes? I believe that people's inclination to learn by doing rather than by being told won't change (Bers, 2009).

Multimedia parks in their many different forms—programming environments, video games, and virtual worlds—might provide children with
opportunities to achieve mastery and competence as developmental milestones. At the same time, they can invite them to experiment with "what if" situations by making, creating, developing, discussing, and debating, as a way to explore their own identity. That is the major developmental milestone for the teenage years, which we will explore in the next chapter.

First the following vignettes will provide examples of how different kinds of technologies, such as the Zora virtual world, the Scratch programming language, and video games, engage elementary school-aged children in mastery and developing a sense of technological competence. The multimedia parks depicted in the next pages support children to become producers of digital projects, rather than just consumers.

Vignette 1

THE PERSONAL MEANING OF JUDAISM

By Marina Bers

Eliza, 12 years old, Cambridge, Mass.
Eliza is participating in a summer workshop using Zora to explore issues of identity in a multicultural setting. She lives in a wealthy part of town and is proud of her Jewish heritage. She wears necklaces with Jewish symbols around her neck and likes to read and write in Hebrew. She is driven, independent, and outgoing. She loves to talk about herself and has many friends. She has strong opinions about what is good and what is bad, and she is not shy to share them with others. Although she is not a technology geek, she quickly learns to navigate the Zora virtual city and to use its tools to create 3-D objects. But for her, the most interesting aspect of participating in the summer workshop is meeting other kids with different religious and cultural backgrounds. She attends a Jewish day school, so she welcomes the opportunity to participate in this summer multicultural workshop.

On the first day of the program, children are asked to create their own virtual homes and populate them with virtual objects to show the other children who they are. Zora's use of objects has been inspired by work that studied the meaning of the most cherished objects that people put in their homes (Csikszentmihalyi & Rochberg-Halton, 1981). These objects not only have a decorative function but also express people's value systems and personal identity.

In Zora, objects have properties that, besides defining their looks and functionality, also specify the meaning or personal and moral values that people assign to them. For example, a 12-year-old boy participating in the workshop created a greenhouse with pictures of bills from all over the world.
When he assigned the value “wealth” to a picture of a dollar and wrote, “I say that money is the symbol of material wealth. Its powers are vast but limited only to the material world,” he was thinking about the meaning that money carries.

Eliza chose to build a virtual temple, instead of a personal home. She wasn’t the only one to do so. Other kids also built a temple, such as Michael, who also built a TV room with his favorite shows. In the Jewish temple, Eliza created a 3-D Jewish prayer book with a blue cover, a sign with her name written in Hebrew letters, and an Israeli flag that flops around. She created yellow walls and a high ceiling. She also created two interactive characters using the Zora heroes function: Steven Spielberg and her dad, who is a rabbi. When clicked, each character tells a story about who he is and why he thinks Judaism is important.

In Eliza’s Jewish temple, every object has a personal story linked to it as well as text aimed at teaching others about Judaism. For example, Eliza wrote the following description for the kippah: “Leather or cloth skullcap worn on the head to both show and feel closer connection to God through the body.” When someone clicks on the kippah, it displays the following story written by Eliza:

I live in the USA, and so I don’t normally see Jews just walking down the street in a non-Jewish environment. Even if I did see one, I wouldn’t know because Jews look the same as everyone else. That’s why I love when I see someone in a kippah. They enable me to know if they are Jewish just by looking at them. I know it is not much, but whenever I see random people wearing kippot I feel closer to them. I know that being Jewish is just as important for them as it is to me.

Fourteen-year-old Axel connects to Zora. He creates an avatar, a virtual representation of himself, and a virtual home. A visit to Axel’s home on Zora reveals much about the boy: his favorite colors, his most loved games, his family’s history, and his friends. After working on his home, Axel navigates through the Baptist church, the French chateaux, and the sports arena. He first enters the Baptist church, and a priest welcomes him with a blessing. Alex finds this clever and decides to keep going around the virtual world. He enters Eliza’s temple, and he clicks on a television that displays a snapshot from the movie Schindler’s List that she found on the Web. He then clicks on the associated value, “documentation,” and reads Eliza’s definition:

It is very important to remember history. That way, bad things won’t happen again. Holocaust survivors are getting very old now, and if someone doesn’t record their stories of what happened, we are doomed to forget and repeat the horrors.
While designing her Jewish temple Eliza explored Judaism, but even more important, she was able to reflect on what Judaism meant to her. She had the time and the space reserved for reflection and introspection. She wrote two or three stories for each object she created as well as many values and definitions. For example, Eliza chose the value “community” and linked it to a picture of her school yearbook. Here is her definition:

At my school I don’t just have teachers and classmates, everyone is friends. I hang out in the office with the staff or in the lounge with my peers. Whenever anyone has a problem, there is someone to whom we can go to for help. That is community.

During her experience in the workshop, Eliza started her journey interested in learning about other children’s cultures and religions. However, as she worked on her own virtual space to teach others about Judaism, she realized that she was exploring what Judaism meant for her and her particular vision of it.

**Vignette 2**

**DEVELOPING AS A COMPUTATIONAL CREATOR**

by Karen Brennan

*Anya, 14 years old, Eastern Europe.*

Anya has loved the visual arts and drawing for as long as she can remember. She sketches on anything she can find and has dozens of sketchbooks, including sketches her mother saved from when she was very young. More recently, she has grown interested in how she can use her computer as a medium for drawing and sketching. She started using some basic paint editing tools but quickly graduated to professional tools like Photoshop and Illustrator.

Her uncle, who is a computer programmer, is supportive of Anya’s artistic explorations with the computer and regularly gives her suggestions for new tools and techniques to try out. Anya’s uncle discovered an article about the public debut of the Scratch Web site in May 2007. Scratch (http://scratch.mit.edu) is a programming environment designed for young people. It makes it easy to create interactive digital media—stories, games, simulations, animations, art—and then share those creations in an online community. Members can view each other’s projects, engage in conversations, and download and remix each other’s work. Anya’s uncle saw Scratch as an opportunity to connect Anya’s digital artistic interests with his programming interests.
After getting the recommendation from her uncle to try Scratch, Anya downloaded it and started tinkering with the sample Scratch projects. Starting with these as inspiration, she made different types of games—a collision-style game, a weather simulator, a greeting card—and shared her projects online. She was happy when other Scratchers in the community tried her projects and gave her feedback, and additionally, she made new friends on the site. She looked at other people’s projects and experimented with remixing—downloading projects and extending them.

One thing she particularly likes to do with Scratch is to create animated sprites or characters. She thinks it is a nice way to bring her sketches to life. Other members were really impressed with her digital drawing abilities and started to make requests for other work. One girl asked Anya to create an animated sprite of a dragon breathing fire. A boy asked Anya to create an animated sprite of a cheetah running along a vast expanse of desert. More and more community members made requests for custom artwork—more than Anya could possibly handle. Inspired, she decided to create a Scratch tutorial project that explains step by step how to sketch different types of animals, objects, and characters.

Julie, a 10-year-old Scratcher from the United Kingdom, was impressed with Anya’s Scratch projects and Anya’s willingness to help others with their projects. Julie asked Anya if she would be interested in collaborating on a larger game project. Anya could create the artwork, another Scratcher could help with the game storyline, another could help with some of the more complicated game programming, and Julie would manage and provide feedback on the collaboration. Anya was excited and agreed to join. She worked with Julie and a small team of Scratchers from around the world, ages 8 to 15, on a series of Scratch projects.

Anya’s active participation and positive activities were noticed by the Scratch Team (MIT researchers who manage the Scratch Web site), and she was invited to serve as a moderator for the community. In this role, she is formally and publicly recognized as a Scratcher whom newer (and older) Scratchers can turn to with questions. She also gives suggestions to the Scratch Team about ways of improving the online Scratch community and the Scratch programming environment itself.

In her almost three years of engagement in the Scratch community, Anya has participated as a computational creator in a variety of ways: creating her own projects, supporting others’ participation as computational creators, collaborating with others to make more elaborate projects, and acting as a moderator and mentor in the community of creators. Now 14 years old, she still uses Scratch to create interactive, dynamic computational media, but she also explores and experiments with other forms of digital expression.
Vignette 3

BEYOND SPORT

by Ashley Sandvi

Avery, 10 years old, Calhoun, Ga.

Avery, normally a reserved 10-year-old boy, becomes visibly exuberant when he talks about playing sports. A natural athlete, Avery recently completed his first season as quarterback of his county’s 9- to 10-year-old tackle football team, the Longhorns. The team had had the same quarterback for three years, so earning the quarterback spot was a major victory for Avery. His first season was a winning one, and Avery loved having a leadership role on the team.

A love for sports is something Avery shares with his five siblings and step-siblings. Before his parents’ divorce, Avery was the oldest of three children. Three years ago, Avery’s mother, Allison, married his stepfather, Thomas, who brought three children of his own to the relationship. So, in addition to Avery, there are five other children in this blended family: Austin, 17; Matthew, 15; Madison, 12; Bryson, 8; and Olyvia, 6.

The merging of the two families was relatively smooth, but each child had to find his or her own place in the new family. For Avery, it’s very different being a middle child instead of the oldest. For Allison and Thomas, it’s a challenge to make sure each child gets enough individual time and attention. Life is understandably hectic with six children under one roof, each of whom is active in sports and other activities. In addition to playing sports in real life, playing sports video games is a favorite pastime in Avery’s home. His family has the Sony PlayStation 2 and the Nintendo Wii consoles, and the kids also have Nintendo DS handheld consoles, which come in handy while they are waiting for their siblings’ sports practices to end.

Two of the games Avery plays most often are NCAA Football 09 on the PlayStation 2 and Madden NFL 10 on the Nintendo Wii. These video games offer somewhat realistic simulations of college and professional football games, respectively. Players can play by themselves against the computer, or they can play with their real-life friends. Both games are immensely popular. EA SPORTS has sold an astounding 85 million Madden games since 1988.

In addition to being entertaining, playing football video games allows players to learn about strategy. Playing the game increases overall knowledge of football, including defenses and coverage schemes, blocking patterns, and play action. Additionally, the video games allow players to establish an optimal level of challenge as they learn the game. Raising the difficulty level and practicing with the mini-game mode helps fine-tune players’ strategy.

Avery feels that the time he spends playing football video games helped him earn the quarterback spot on his team. Though his strong throwing arm didn’t hurt, Avery believes that the reason he earned the position is that he’s the only player his coach trusts to remember all the plays. The ability to learn and
.practice plays through simulated video games makes them much easier for Avery to remember in real life. There are also more tactical benefits of playing football video games. In particular, Avery was excited to learn how to "juke" other players out—that's when he makes them think he's going one way but turns around and goes the other way to get a touchdown. Having the chance to practice bold plays in the simulated games makes him a more confident player in real life. He also says that the stretches he learned from the video games helped him increase his speed, which is important when he runs the ball.

Good quarterbacks must earn the trust of their team members, and playing football video games with other players on his team has been a fun bonding experience for Avery. The games allow players to play together on the same team or against each other as competitors. Playing football together using the video game helps Avery and his teammates develop a camaraderie that is different from that which develops during practice and real-life games. The close physical proximity while playing a video game allows the players to encourage each other and collaborate for an extended, uninterrupted period of time, as opposed to short bursts of time in a huddle on the field. Playing video games with his teammates helped Avery realize the importance of working together and encouraging each other. Now, Avery always makes an effort to encourage other players to get back up after being tackled and get back in the game. That's a life lesson that goes far beyond the football field.