JumpStart World: A learning program that knows and grows with your child

A White Paper for Knowledge Adventure
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Executive Summary

JumpStart World for children in kindergarten through second grade is a whimsical, compelling 3-D community of rich environments and colorful, responsive characters *and* an intense, targeted learning program for mathematics, reading, and critical thinking. The world and characters grow with the children, expanding in breadth and depth to reflect the authentic experience of a child on a mission of discovery in real time and to provide an ever-challenging intellectual and emotional experience. *JumpStart World* is predicated on best practices in interactive learning and integrates current research and strategies to ensure an optimum learning experience.

- Brain Research: "The neural pathways that control the basic functions we need to survive—heartbeat, temperature control, breathing—are already connected at birth, but many more pathways are determined by the greatest environmental factor in our lives: learning" (Ratey, 2001, p. 34). *JumpStart World* incorporates the principles of brain-based learning to ensure that it is immersive, intrinsically motivating, challenging, and responsive.
- Technology and Interactivity: Knowing that educational technology does result in learning, perhaps the question we should now ponder is how we can optimize learning with technology. . . ." (Marshall, 2002, p. 23). *JumpStart World* optimizes the use of technology, harnessing its power to create authentic 3-D interactive learning environments.
- Standards-Based Instruction: "Programs and practices grounded in scientifically based research are not fads or untested ideas; they have proven track records of success" (U.S. Dept. of Ed., NCLB, 2003, p. 18). *JumpStart World*'s reading, mathematics, and critical- thinking games and activities are based on a scope and sequence that is research-based and aligned to state and national standards.
- Curriculum Design: "Providing students with curriculum that integrates technology in authentic and challenging ways" is an essential component of educational software (Clark, 2006, p. 496). Additionally, integrated educational products may create "instructional learning environments that are individualized and adaptable" (Clark, 2005, p. 441). *JumpStart World* represents best practices in curriculum design, structuring learning in coherent chunks; integrating story, character, and learning objectives; and providing missions and spiral learning games and activities that provide scaffolding for learning integration and acquisition.
- Character and Story: "Filled with the elements of the characters' internal experience in the context of interactions with others in the world, [these] stories appear to be functioning to create a sense of coherent comprehension of the individual in the world across time" (Siegel, 1999, p. 323). *JumpStart World* provides children with characters that model affective behaviors and learning styles and with environments and interactivity from which they can create their own unique stories.
- Parent and Community Involvement: "Parents can use what they know about their child's profile to etch a plausibly positive engraving of the

future, an alluring vision that will sustain motivation and ambition" (Levine, 2002, p. 306). *JumpStart World* supports parents' involvement with their children, keeping them apprised of educational progress and providing home activities that reinforce and enhance computer learning in mathematics, reading, and critical thinking.

Brain Research and Learning

"Brain research establishes and confirms that multiple complex and concrete experiences are essential for meaningful learning and teaching" (Caine & Caine, 1994, p. 5). *JumpStart World* leverages the brain's natural learning processes using an underlying design based on research in cognitive psychology and the neurosciences. Brain research suggests that the brain is driven by a search for meaning, and in this search, it uses patterns, connections, and relationships (Caine & Caine, 1994). In short, the brain and learning based on its rules have a symbiotic relationship: Learning is not only a natural function of the brain, but also critical to the brain's development. *JumpStart World* harnesses the power of this symbiotic relationship.

Immersive environments optimize learning by providing ample opportunities for exploring patterns, relationships, and connections through problem solving, decision making, creative thinking, and metacognition (Green, 1999). *JumpStart World* is filled with immersive 3-D environments that offer people, places, and interactions for the child to explore and develop personal relationships. All learning games exist within these environments, positioning learning as a natural outcome of engagement with the world—mirroring the natural learning process each adult or child engages in daily throughout life.

Learning games themselves offer close-to-ideal, brain-based learning experiences. Research shows that people learn best when they are self-motivated and fully engaged (Tuckman, 1999). The design of games—characters, graphical environments, game play, goals, rules, surprises, rewards, replayability—exercises the power of the brain and play to engage, motivate, and challenge children's minds. "Games push learners forward, forcing them to stretch in order to respond to problems just on the outer limits of current mastery" (Jenkins, 2002, p. 2). Games stimulate interest and deep thinking, guiding children to learn specific concepts while applying critical-thinking and metacognitive skills to inform their movement and interactions.

Intrinsic motivation affects sustained interest, which in turn influences what, and how effectively, students learn (Malone & Lepper, 1987; Chapman, 2003). Games are intrinsically motivating because they cause the brain to be in a state of flow. Mihaly Csikszentmihalyi has defined flow as a state of mind that is harmoniously organized. According to his theory, flow is created in situations where the goal is clear, the challenge is achievable, and the feedback is accurate (Csikszentmihalyi, 1988, 1991) *JumpStart World* provides experiences, explorations, games, and activities that engage the minds of children with interactive challenges in which goals are clearly stated and reinforced, play and

exploration are ongoing, replayability until and beyond mastery is fostered, and feedback is immediate and appropriate.

JumpStart World provides environments and characters that inspire emotional engagement since brain research shows that emotion "drives attention which in turn drives learning and memory" (Sylwester, 1994, p. 60). Learning and emotion are interdependent. In fact, the ability to reason is dependent on emotions, allowing us to "judge situations effectively without our having conscious access to them" (Ratey, 2001, p. 250).

Technology, Interactivity, and Learning

"The computer is the Proteus of machines. Its essence is its universality, its power to simulate. Because it can take on a thousand forms and can serve a thousand functions, it can appeal to a thousand tastes" (Papert, 1980, p. 1). Since becoming widely available in the 1970s and 1980s, computer technology and software have supported children's education and learning. In 2001, 65% of children from 5 to 17 years old used computers at home, and 81% used them at school (U.S. Dept. of Ed., 2003). Researchers studying the effects of computers on children have assigned a high correlation between well-designed instructional programs and the cognitive development of children (Pierce, 2004). *JumpStart World*'s software program fulfills the promise of the computer's potential for fostering children's learning using contemporary, research-based strategies.

"Educational technologies expand our access to new information and support our efforts to make meaning" (Marshall, 2002, p. i). *JumpStart World* facilitates brain-based learning, allowing children to experience and interact with concepts and integrate new concepts into those mastered. "Technology can create learning environments that support the making of associations by providing access to new challenges, contexts, and information" (Marshall, 2002, p. 6) In the *JumpStart World* environments, the child makes connections and builds associations, thereby making meaning—stretching and developing the brain and increasing the depth and breadth of learning.

Research demonstrates that technology built from best practices can affect learning because it causes children to build a variety of abilities from memorization to abstract thinking in a variety of content areas (Wenglinsky, 1998; Arroyo, 1992; Dwyer, Ringstaff, & Sandholtz, 1990; Nixon, 1992). *JumpStart World* harnesses the power of technology through its implementation of the learning experience. According to Dr. Kevin Clark, Associate Professor of Instructional Technology at George Mason University (GMU), "Technology opens possibilities, provides access, and personalizes interaction" (K. Clark, interview, June 27, 2006). Its functionality allows each individual child to build creative and critical-thinking skills in the areas of reading and mathematics through multiple interactions in which the child:

- customizes his or her own learning environment by choosing an avatar, importing own photos, and decorating personal spaces
- selects a path, location, and learning game or activity
- plays increasingly more challenging content and game-play levels

- experiences emotional success through successful completion of a mission
- explores creative and whimsical environments from the sea, to a glacier, to a dinosaur raceway
- replays a game until and beyond mastery
- selects and provides care to a pet of his or her own choosing
- collaborates with the *JumpStart World* community to accomplish the mission

Standards-Based Instruction

In January of 2002, the No Child Left Behind (NCLB) Act of 2001 reauthorized the Elementary and Secondary Education Act, requiring that states, school districts, and schools be accountable for the academic performance of students. To ensure that students can master the learning objectives necessary for successful academic performance, all curricula must be scientifically based and aligned with state and district standards (U.S. Congress, 2001).

"Recent data from the Northwest Evaluation Association indicates that virtually the entire gap in language achievement and almost 70 percent of the gap in mathematics achievement are created before the beginning of second grade and most likely between birth and kindergarten" (Fielding, 2006, p. 1). *JumpStart World* addresses these nationwide challenges directly. It aligns with school curricula and with national and state standards. Its reading and mathematics learning objectives for kindergarten, for first grade, and for second grade are correlated to these standards and also to those of the National Council of Teachers of Mathematics, the International Reading Association, and the National Council of Teachers of English. *JumpStart World* directly supports children developing emergent skills and abilities in reading, mathematics, and critical thinking at the earliest stages. Early success in these content areas, married with increased skills in the child's very ability to facilitate his or her own learning, establishes a trajectory for ongoing success throughout the elementary grade levels.

Feedback, or knowledge of results, is critical to reflective learning. Understanding gaps between current and optimal performance serves as a press for action. *JumpStart World* provides progress reports that summarize the child's progress on learning games and activities. These reports, when coupled with the immediate feedback provided within activities, offer a comprehensive, formative assessment program. Formative assessment occurs easily as children play learning games, their scores are tracked, and they are awarded gems for high scores. This continuous, nonpunitive and automatic feedback guides the children to higher and higher performance. The child, parents, teachers, and caregivers can assess the child's learning performance and use this assessment to modify and enhance the learning experience.

Curriculum Design

The J*umpStart World* curriculum puts the learning needs of the child in kindergarten through grade-2 and brain-based learning at the core of its design. It presents concepts in a variety of environments and game formats to ensure that each child, regardless of cognitive style, takes advantage of the diversity of strengths (Gardner, 1993, 2004; Dunn, 1995). With over 200 learning lessons in kindergarten and approximately 300 each in first and second grade, *JumpStart World* spirals what it introduces and presents by repeating and reinforcing content. Using a learning design with its foundation in the instructional sequences created by Robert Gagne and Madeline Hunter, the *JumpStart World* program provides all the components necessary for learning to occur (Gagne, Briggs, & Wager, 1992; Hunter, 2004).

JumpStart World exploits the brain's search for meaning on a variety of levels. A rich variety of 3-D environments designed for exploration and play reinforce *JumpStart World*'s underlying connectivity. Children are engaged in a mission during which they seek meaning through exploration and performance. Kindergarteners are deployed on a JumpScout mission to become the Ultimate Scout: first graders on a mission to earn the Key to the Town; and second graders on a mission to become a True Hero.

Embedded in these meta-missions, the learning games become part of a higher quest. Children earn gems while they explore and play a spiral series of learning games with content in mathematics, reading, and critical and creative thinking. Memory and learning are both improved when content occurs repeatedly in a variety of interactive experiences (Caine, Caine, & Crowell, 1999). Therefore, the design of the content and game play ensures that they become more challenging as the child works through *JumpStart World* and its games.

Interactions at the activity level require several different kinds of behaviors. Some behaviors require that children practice skills and processes that require both remembering and using concepts. Others require that they stretch their imaginations, visualizing and then creating their own environments. Still others require that children care for pets or nature over time, reflecting and reinforcing connections among living things.

The following principles were applied during design:

- The world, its environments, games, and activities will encourage not rote skills and memorization but an intrinsically motivated search for meaning.
- The design of the world will be appropriate to the age group.
- As children advance from kindergarten to first grade and first grade to second, characters will age; content will become increasingly difficult; and world experiences will expand; however, the world itself will remain the same.
- The 3-D world will reflect the real world in its physics, community structure, and interactivity.
- Technology will support, not overpower, learning.

- Reading and mathematics objectives will be leveled so that as children master a set of learning activities, they can progress to the next level of challenge.
- Whimsy, color, sound, music, animation will be integrated for a multisensory, multimedia experience.
- Learning will be active not reactive; participative not passive; connecting not isolating.
- Learning activities will respect the individual child's background, culture, language experience, abilities, and strengths.
- Learning will be scaffolded so that children are always connecting concepts and building on what they already know.
- Characters will have diverse appeal in terms of appearance, movements, voice, characteristics, abilities, and idiosyncrasies.
- Environments will be equally comfortable for both genders.
- Characters will demonstrate good character traits but still be whimsical and fallible.
- Characters will move beyond traditional stereotypes and be multidimensional.

Character, Story, and Learning

Character and story provide a crucial element in *JumpStart World*'s interactive learning experiences. Dr. James Marshall of San Diego State University's Department of Educational Technology suggests, "Story and character are age-old devices used to relate information and knowledge. Together they bring *context* to instruction, and it is that context that helps learners make the cognitive connections that facilitate long-term retention and future application of learned skills and knowledge" (J. Marshall, interview, June 26, 2006). Characters and stories enhance children's immersion in the learning world and emphasize the significance of the search for meaning. The avatars and community characters evolve the learning experience from passive to active, providing children with feedback and interaction. They transform the child's role in learning by adding the dimension of emotion and authenticity and by bridging the gaps between the child's current knowledge and understanding—and the new content being presented.

The child's selection of an avatar at the beginning of each grade level provides the opportunity to interact fully with the learning environments. Avatars personalize the learning experience as children move through the 3-D *JumpStart World*, driven by keyboard commands that the child issues. As learning agents, the avatars can both encourage and contribute to learning (Clark & Mayer, 2003). As the environment grows with the child, so does the selection of avatars.

The community of characters in the *JumpStart World* reflects the unique personalities and learning styles of the children themselves. Pierre the Panda is driven by a passion for music; Eleanor the Elephant by dance and reading; CJ the Frog by adventure; Keisha the Tiger by painting, racing, and running; and Hops the Rabbit by creating inventions. These characters respond to and interact

with the child's avatar in each environment. In second grade to this community of benign characters, two flawed characters are introduced to reflect that adversity exists but can be overcome in this authentic world.

The story in *JumpStart World* is driven by the individual child's experience of the interaction between his or her avatar and the environments, characters, and learning games in which they engage together. Children at each grade level are motivated to move through the environment to explore and accomplish a critical mission. Kindergarteners are Jump Scouts and are on a mission to accomplish learning feats and thereby collect badges. The badges focus on character building with children earning badges for characteristics from dependability through fairness and the environment. First-graders are Town Leaders and collect keys on their mission to lead and interact with the town's citizens. They earn keys for a variety of characteristics including inspiration and truth as well as thoughtfulness and knowledge. Finally, second-graders are Heroes, collecting shields as they use their powers, both intellectual and creative. They earn shields for a wide variety of superhero traits, including training, challenge, culture, and vision. Dr. Kevin Clark, Associate Professor of Instructional Technology at George Mason University, proposes, "Character and story are powerful tools for modeling knowledge acquisition, critical thinking, and positive behavior" (K. Clark, interview, June 27, 2006). *JumpStart World* provides children with these powerful tools to enrich and deepen their learning experience and ensure an optimal environment for cognitive and affective learning.

The Role of Parents and Community and Learning

There is consensus among educators, parents, and teachers that when parents and the larger community are involved in a child's learning, achievement increases (Herman & Yeh, 1983; Berla, Henderson, & Kerewsky, 1989; Hester, 1989; Jeynes, 2006). A recent meta-analysis of 77 studies that included over 300,000 students in kindergarten through grade 12, concluded that higher academic achievement was achieved by students whose parents were involved (Jeynes, 2006). The particular area of involvement that exercised the most impact on achievement was the expectations of parents. *JumpStart World* is designed to leverage the role of parents in children's learning experiences, increasing quality involvement and raising expectations.

- *JumpStart World* is tied to school year. Parents receive twelve learning packages at intervals determined by their child's progress and performance. To achieve optimal benefit, learning activities are in small segments with the expectation that a child will spend at least thirty minutes a day engaged in the program.
- *JumpStart World* progress reports list mathematics and reading objectives that the child has mastered. They also provide parents with a special Problem of the Month to work with their child to solve.
- *JumpStart World* allows parents to select the holidays that they want their child to celebrate; add personal photos; and view progress reports.

- *JumpStart World* Parent Tips contain learning activities to play with the child away from the computer. These reinforce and enhance the computer-based learning.

An important, if not the most important, constituency for parents is the community of parents with children of the same age or grade as their own; this vision of technology-facilitated parental involvement includes learning communities that inform, coach, and instruct parents and caregivers (Marshall & Rossett, 1997; Blanchard, Stock, & Marshall, 1999). *JumpStart World* parents can participate in online discussion groups with other parents who have children in the same grade. This allows them to share experiences, build realistic yet high expectations, and support each other in educating their children. Encouraging the type of parental collaboration integrated into *JumpStart World,* Dr. James Marshall of San Diego State University's Department of Educational Technology states, "My research examining online learning communities—communities that bring together like-minded individuals with common interests and goals—indicates that peer-to-peer collaboration can be a very effective means for sharing knowledge, as well as developing new ideas and perspectives" (J. Marshall, interview, June 26, 2006).

For children, *JumpStart World* models how to collaborate and interact with communities outside the home. Interactions with the *JumpStart World* community and its characters allow children to develop the community skills necessary for good citizenry:

- use of social etiquette
- development of positive character traits
- safe interactions based on good decision-making

JumpStart World provides a learning environment where parents and the community of parents support each other and in so doing facilitate optimal learning for each child. The child's learning in mathematics, reading and critical thinking is linked to home and community life, establishing the underlying connectivity of authentic learning, providing the foundation for academic success, and establishing the role of learning in personal fulfillment.

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