Computer Assisted Instruction for 21st Century Psychology

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Computer assisted instruction (CAI) takes advantage of the fast processing powers and multi-media output capabilities of computers, to administer psychological skills training to an increasing number of mental health users (Lyytinen, Ronimus, Alanko, Poikkeus, & Taanila, 2007; Räsänen, Salminen, Wilson, Aunio, & Dehaene, 2009; Sansosti, & Powell-Smith, 2008). According to the National Institute of Mental Health (NIMH, 2010), about one in four adults has suffered from a mental disorder (Kessler, Chiu, Demler, & Walters, 2005 as cited in NIMH, 2010). As such, the area of psychology and computer assisted instruction have a lot to gain in the 21st century, from the continued use of computer technology. The field of psychology must continue to allow computer assisted instruction to facilitate society's much needed development of various psychological skills. What follows are five illustrations of exactly how computer assisted instruction has accomplished this to date. Each unique example demonstrates how without computer assistance, psychological skills training would become critically limited in its capacity to serve society.

A vivid example of the use of computer assisted instruction in psychology comes from the field of neuropsychology. Neuropsychologists have turned to mainstream action video games to develop the visual skills of sufferers of a sight disorder named amblyopia (also known as "lazy eye" [Achtman, Green, & Bavelier, 2008]). According to Achtman, Green & Bavelier (2008) amblyopics need highly visually stimulating environments to exercise and regenerate the deteriorated neural pathways that service their eyes. The intended calibre of visual stimulation in the environment that amblyopics need to stimulate their neural pathways is akin to that experienced in military war battle and live-ammunition target-practices. That is why neuropsychologists such as Achtman et al. (2008) have employed action video-games as the

chief available medium to effectively exercise amblyopics' visual neural pathways. In battle action video-games such as “Medal of Honour”, players track, aim and shoot at fast-flying objects, or chase after objects in virtual aircraft. This type of visual-motor tracking can facilitate eye-sight recovery in amblyopics (Achtman, Green & Bavelier, 2008). Simulations of visually complex scenes and action sequences found in real life are made possible only through the advent of the advanced computer video card. The 21st century advancements made in computer video card processing power (Kasik, 2008), are what make fast-action aim and shoot motion practice possible for these mental health users.

The remedial as opposed to recreational uses of multi-media computer technology becomes even more clear through multi-media educational programs. One such slide-show program named “Social Stories” has been designed to successfully engage children with high-functioning autism into fruitful social skills training (Sansosti & Powell-Smith, 2008). Sansosti & Powell-Smith (2008) incorporated digital video recordings of typical social scenes they had made into slides from “Social Stories” using Microsoft PowerPoint. Thanks to what computer scientists call the “accessibility” or ease in using Microsoft PowerPoint, amateur computer users like Sansosti & Powell-Smith have used not only text slides, but computer “voices”, sound effects, image effects and even videos to successfully grab their clients’ attention (Sansosti & Powell-Smith, 2008). Such accessibility is well-appreciated. The computer is about the only thing that can capture the attention of an autistic child, who suffers from a disorder that attacks one’s social development and communication skills (Sansosti & Powell-Smith, 2008).

For children with learning disabilities, the possibilities for computer assisted instruction are numerous. For learning difficulties, professionals in education have turned to artificial intelligence and computer-human interaction to engage and train afflicted children (Lyytinen et

al., 2007; Räsänen et al., 2009; Sansosti & Powell-Smith, 2008). Common childhood afflictions that are being remediated by computer assisted instruction include dyslexia which attack reading skills and working memory disorders which compromise math skills.

Applications such as “Number Race” (Räsänen et al., 2009) which develop math skills, and “Literate” (Lyytinen et al., 2007) which develops children’s reading skills, can engage and tutor children for hours without requiring the presence of human agents. When computer scientists define artificial intelligence as a computer’s ability to delegate tasks without the need for human agents, they are describing intelligent agency (Kabanza, Dominic, & Bénié, 2001). Intelligent agency can require some computer-human interaction (Prada & Paiva, 2009) — in this case, interaction with children. From the vantage point of a school teacher whose agency is traditionally required for the instruction of children, any game such as “Number Race”, “Literate” or even “Social Stories” qualifies as intelligent agency relieving teachers from countless hours of extracurricular tutorial. The prospect of intelligent agency that is surrogate to a school-instructors’ active presence among students is very attractive. A school events coordinator by the name of A. A. Hodgins (personal communication, May 15, 2010) from the Community Learning Centre in Campbell’s Bay, Quebec, reports how it is not uncommon for teachers to exceed the standard eight hour work day to mark tests and assignments, attend to meetings and run extra-curricular activities. Add on remedial classes, and extra tutorship and a typical school instructor's time can become quickly exhausted (A. A. Hodgins, May 15, 2010). Intelligent agency in applications such as “Literate” (albeit rudimentary intelligence) consists of increasing the cycle-through speed of reading skill drills after a child has mastered basic drill levels, and the repetition of audible letter sounds when children are too latent in their response to a reading drill question (Lyytinen et al. 2007). These intelligent agents do not replace traditional

school instruction, but can help dyslexic children who are falling behind catch up to their classmates (Räsänen et al., 2009).

The measurement of success of educational tutorials or of other skills trainings such as visual skills trainings, depends on scientists' access to psychological skills measurement tools. Skill measurement tools have been made available to the psychology laboratory, for use in measuring the effectiveness of computer assisted instruction applications. To measure progress in visual skills, math skills, or even reading skills, the field of psychology research has had to use computers to distinguish between tiny nuances in reaction times people have had to relevant stimuli (Achtman, et al., 2008; Lyytinen et al., 2007; Räsänen et al., 2009). To measure participants' progress in reading ability for example, researchers constructed a no-name computer application separate from "Literate". Unlike Literate which has drilled children in single-letter recognition exercises, this research computer test measured how fast young people with dyslexia could recognize whole syllables or entire words spoken by the computer's "voice" (Lyytinen et al., 2007). Measurement was simple and direct in that as soon as research participants would click on an answer to a multiple-choice question, the computer processor's timer would measure the timing of the participant's response down to the millisecond. Without the use of the computer, measurements of how quickly participants could read words before and after their treatment with the game "Literate", would be significantly less precise and reliable. According to the application developer of the Canadian Resident Matching Service in Ottawa, there is no single aspect of an application that contributes to its fast processing power. Rather increases in general computer performance have allowed data collection applications to make measurements at levels of precision that far exceed the capabitilities of human agents (R. J. T. Salter, personal communication, May 19, 2010).

Computers of very high standard are becoming more and more available and accessible to psychologists, educators, and laypersons alike (Sansosti & Powell-Smith, 2008). The field of psychology and psychological skills training originated in the late 1800's (Walsh-Bowers, 2010). That said, psychology's greatest potential for dramatic, positive impact on society lies with 21st century computer technology advancement.

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Notes

the sole purpose of educational drill instruction. Games such as “the Number Race” and Graphogeme numbers snes- make use of drilling, or extensive repition of instruction to condition children into crucial fundamental math and counting skills. The Number sense game repeatedly sifts through screenshot

-math – repition / drilling
-reading – saves human resources for problems that need more involved intervention
-mood – accuracy in pre- and post assessments in reaction time for mood research
-autism – engages recipients of training in ways that classrooms/ teachers cannot

Tracking flying visual objects and coordinating one’s motor faculties to shoot them down cThe war-scene simulations, or aim-shoot target practises that charge These games simulations that train visual-motor skills in the vi
- visual VG – allows simulations of unrealistic events to facilitate psychological skills acquisition

failing to satisfy the hunger for psychological remediation– some people do no even need professional advice, so much as to create for themselves, happier habits.