

## Using Games to enhance critical thinking skills and dispositions

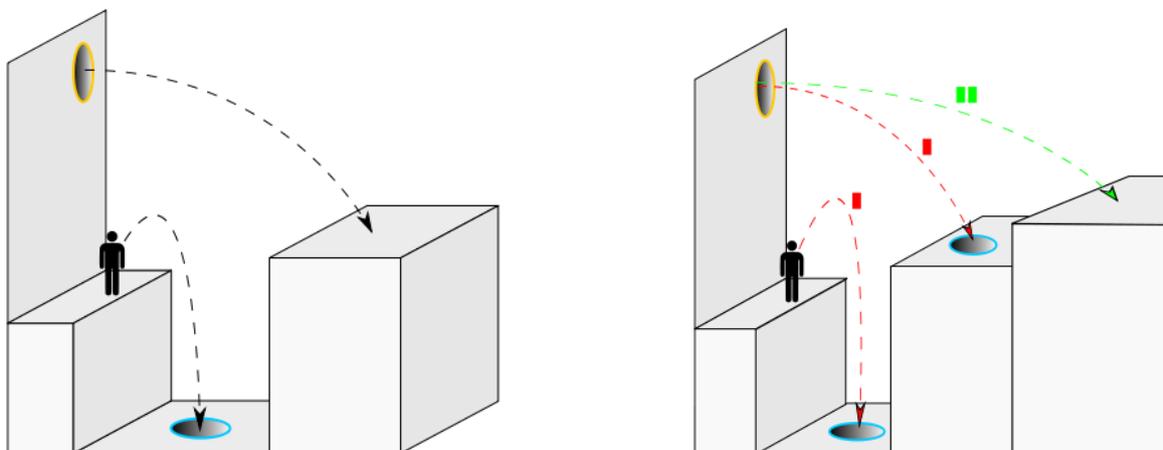


~ Byron Bunt ~

I would like to start by thanking IACESA for this chance to make a difference in Cognitive Education within South Africa. I take on this role with a sense of responsibility and urgency. Education within this country needs to start focusing on how content is delivered instead of what content is being delivered, and Cognitive Education is the answer to this. A shift from focusing on assessment towards focusing on teaching and learning needs to be implemented.

However, that being said, we also need to take into account that we are dealing with 21<sup>st</sup> century, digitally inclined children at schools. Any kind of reform within the cognitive domain of learners needs to employ a strategy that they are familiar with and enjoy. To that end, I propose a cognitive enrichment program that utilizes a video game called Portal, which was designed by Valve Software and is free to use for educational purposes.

The game primarily comprises a series of puzzles that must be solved by teleporting the player's character and simple objects using "the Aperture Science Handheld Portal Device", a device that can create inter-spatial portals between two flat planes. The player-character, Chell, is challenged by an artificial intelligence named GLaDOS (Genetic Lifeform and Disk Operating System) to complete each puzzle in the Aperture Science Enrichment Centre using the portal gun with the promise of receiving cake when all the puzzles are completed. The game's unique physics allows momentum to be retained through portals, requiring creative use of portals to manoeuvre through the test chambers.



A representation of how the (magnitude of) linear momentum is conserved through portals. By jumping into the blue portal, the character is launched out of the orange portal and onto the platform on the right.

A more advanced portal technique. The character builds up speed using two blue portals, to reach an otherwise unreachable area. The second blue portal is carefully created in mid-air, after exiting the orange portal for the first time, destroying the first blue portal in the process.

Several critics wrote that Portal excels in teaching the player to solve puzzles; in a review for the New York Times, Seth Schiesel wrote, "Somewhere out there an innovative, dynamic high school physics teacher will use Portal as the linchpin of an entire series of lessons and will immediately become the most important science teacher those lucky students have ever had." Mathematics and science teachers wrote e-mails to Valve to tell them how they had included Portal in their classroom lessons as part of a project to promote the "gamification of learning". Portal developers Joshua Weier and Yassr Malaika led a team within Valve to explore ways of using Portal for education. This led to the development of Puzzle Maker, a level editor for Portal players, built from the professional tools used to develop the game. Weier and Malaika did not want to design curricula themselves, but wanted to provide educators with tools for creating lesson plans. Valve gave Puzzle Maker an easy-to-learn interface and the ability to share puzzles and lesson plans. This formed the basis of a new "Steam for Schools" initiative launched in June 2012, under which educators could acquire Portal and the Puzzle Maker software free of charge for classroom use through its "Teach with Portals" program. As of November 2012, Valve estimates that over 2,500 educators are using the "Teach with Portals" software within their lesson plans.

From this it is clear that Portal can indeed benefit education, with specific mention of cognitive skills such as critical thinking and problem-solving. Critical thinking is clear, reasoned thinking involving critique. According to Beyer (1995), critical thinking means making clear, reasoned judgments. During the process of critical thinking, ideas should be reasoned and well thought out/judged. The National Council for Excellence in Critical Thinking defines critical thinking as the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.

Problem solving consists of using generic or ad hoc methods, in an orderly manner, for finding solutions to problems. Problems can also be classified into two different types (ill-defined and well-defined) from which appropriate solutions are to be made. Ill-defined problems are those that do not have clear goals, solution paths, or expected solution. Well-defined problems have specific goals, clearly defined solution paths, and clear expected solutions. These problems also allow for more initial planning than ill-defined problems. Being able to solve problems sometimes involves dealing with pragmatics (logic) and semantics (interpretation of the problem). The ability to understand what the goal of the problem is and what rules could be applied represents the key to solving the

problem. Sometimes the problem requires some abstract thinking and coming up with a creative solution.

Let us start thinking with portals!

Take a look at the game's trailer here: <https://www.youtube.com/watch?v=ujYcnO0slks>

# PORTAL™

