



Educational Benefits

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Pajaggle™ provides both students and teachers with the opportunity to learn.

Overview: The Pajaggle™ game ("Pajaggle") is a new form of a puzzle game consisting of multiple puzzle pieces, many of which have similar shapes differing only slightly in their dimensions (i.e., several "daisy" shapes of similar sizes and several "starburst" pieces of similar sizes). Properly solving the puzzle involves identifying some "pieces in pieces" named doublers (e.g., a starburst piece whose proper location is within another starburst piece is a "doubler"). This similarity of puzzle pieces and the presence of doublers makes the game challenging and affords players the opportunity to develop multiple solution strategies.

Why Pajaggle is Important: Unlike other puzzle type games, Pajaggle provides a unique educational benefit in that it requires *the use of multiple senses* in puzzle solving, and offers *multiple solution strategies* for effective puzzle-solving. Playing solitary Pajaggle requires multiple senses; both touch and sight are requisites for effective puzzling. When Pajaggle™ team games are utilized, they instill additional hearing and speech requirements for effective communication during puzzling. When playing Pajaggle, participants are faced with evaluating multiple solution strategies, and successful puzzling requires they identify *their* optimal solution strategy such as grouping similar pieces together (categorization), matching and comparing sizes of pieces (compare and contrast), or attempting to place a piece in multiple possible locations until the proper piece location found (haptic or "touch-related" search and verification).

How Pajaggle Facilitates the Learning Process: In addition to the increased cognitive load required by multiple sensory processing and by the presence of multiple solution strategies, Pajaggle facilitates learning for both students and instructors by allowing educational benefits to be achieved through the flexibility of Pajaggle.

Students learn more effectively through higher levels of involvement (they are more "interested" in finding solutions) and through the use of multiple-sensory processing (i.e., processing involving the use of both vision and haptic [touch] input). Multiple-sensory processing ensures increased activation of both right- and left-brain activity than does sole-sensory activity. Increased activation has been linked to improved concentration, attentiveness, and mental acuity of students. *Instructors* are afforded the opportunity to learn how to best meet the needs of their students through Pajaggle's flexibility. Following are examples of how Pajaggle can be used to facilitate a number of educational benefits.

Categorization Skills: Pajaggle's use of multiple shapes facilitates the improvement of students' object recognition skills and helps students determine similarities and differences between Pajaggle™ pieces. Longer term benefits to students include improved higher-order and abstract thinking.

Strategic Thinking: Students can be encouraged to develop and discuss their strategies for solving Pajaggle. This fosters communication skills, and increases student awareness and appreciation for multiple intelligences; some students might be more kinesthetic learners and benefit most from touch-related strategies, while other students might be a more visual learner and benefit most from visual search strategies. Student can discuss and evaluate strategies which can foster empathy and awareness of others in addition to increasing puzzling effectiveness.

Descriptive Analysis: Many attributes and features of Pajaggle require descriptive analysis beneficial to the learning process. For example, students can be encouraged to find multiple ways to creatively describe pieces (color, texture, number of curves, size of pieces, etc.), and describing sources of puzzle difficulty requires identification, analysis, and assessment skills.



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Disability Awareness: Due to the need for multiple senses (sight, touch) to solve Pajaggle, temporarily removing or degrading one or more of the senses can be challenging for effective puzzle solving, and thereby make students aware of the needs of others. Puzzling without sight (playing blindfolded), team games where one player is "sighted" and one is not, and haptically degraded puzzling of varying degrees (students playing Pajaggle while wearing mittens, garden gloves, or surgical gloves) can foster discussion about what it is like to be visually or physically impaired.

Spatial Awareness and Intelligence: Pajaggle involves the physical and mental manipulation of objects (puzzle pieces) to determine fit. Because of the timed nature of the task (either against another person or the clock), the mind is forced to process information at an accelerated pace. The effect of repeated accelerated manipulation of objects increases the player's ability to visualize spatial characteristics and location of objects in both two- and three-dimensional space; thus increasing spatial intelligence and making students more visually and haptically discerning. Spatial intelligence has been found to be highly correlated to success in various fields requiring extensive object manipulation such as mathematics, engineering, and architecture.

Coping Skills: Although intended to be enjoyed while being played, Pajaggle in a competitive format can induce age-appropriate levels of stress. Learning how to cope with stress, and having a student discuss how they handle stressful moments during puzzling, can facilitate the development and improvement of individual student's coping strategies needed for both academic success and for improving life skills required for success.

Teamwork Skills: Many different Pajaggle™ games can be played in settings demanding teamwork between participants. These games foster social awareness and communication, as well as develop relationships between gaming partners. Developing division of labor skills (You look for all daisies, I'll try to fit them") and assessment of team members' abilities are transferable skills for project- and team-based work.

Language Skills: Although neither language nor reading skills are needed in many versions of Pajaggle, both can be utilized by instructors if needed to meet learning objectives. Game instructions, challenges, directed tasks, and "road map" activities (What direction do you have to go to get to the biggest starburst piece from the smallest daisy piece? Can you describe the piece in the upper right hand corner?) can all be played with both spoken and written instructions and answers.

Memory Enhancement: In improving puzzling ability, the locations of pieces on the puzzle board can be learned. For example, with respect to the 2009 Pajaggle Tournament board, the sockets to accept pieces are fixed, and thereby, the specific location for each piece for this board can be memorized with effortful learning, providing students with skill and experience encoding visual stimuli and spatial relationships into memory.

How to Proceed: Most instructors start with one Pajaggle™ game for every four students to allow all students to become familiar with the games; several instructors have obtained one game per student, depending on their educational objectives and levels of student interest. Games may be purchased at <http://www.Pajaggle.com/> and quantity and educator discounts are available.

For additional information please visit (<http://www.Pajaggle.com/>), or call 866-966-6612, or e-mail at info@Pajaggle.com.

**This informational essay has been written for Pajaggle by Dr. Malkewitz in his capacity as an expert in the areas of information processing, learning, and visual fluency. The essay reflects his views on the educational benefit of Pajaggle. The essay is not to be taken as an endorsement of "Pajaggle" by Oregon State University.*