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EDTC 625
Systems Thinking

In 1990, Peter Senge published the book, *The Fifth Discipline;* it was updated in 2006. According to Senge, there are five "disciplines" that drive successful learning organizations. These include: personal mastery; team learning; mental models; building a shared vision; and systems thinking (2006). One can view a classroom as a learning organization, with each discipline interacting to promote success for all students.

A systemic model, as opposed to technocentric approach, was used to integrate three different projects into a classroom. In other words, the system of the learning environment – not the technology itself – was the focus of design. The projects developed included: a trading card game to deliver information using the Universal Design for Learning (UDL) Framework, a constructivist technology proposal involving an assistive device, and a series of flipped classroom lessons.

Each project was tied to concept of personal mastery. Senge wrote, "The ability to focus on ultimate intrinsic desires, not only on secondary goals, is a cornerstone of personal mastery" (2006, p. 137). The projects used a game-like approach, "leveling up" skills, similar to Lev Vygotsky's zone of proximal development (ZPD), in which new skills are scaffolded upon known information. If a game is designed effectively, then the player should enjoy the experience and be intrinsically motivated to succeed. In other words, the high score should not matter; rather, the satisfaction comes from the process. Personal mastery in the proposed UDL trading card game relied heavily on a win-lose paradigm, which could impinge on one's desire to master a skill. Therefore, the card game may fall short in this domain. The assistive game device project utilized the

iterative design; mastery was inherent in its process. Watching others succeed based on one's one creations can give the designer a deep feeling of satisfaction. The flipped classroom lessons exemplified personal mastery. It takes mastery learning and "marries them with modern technology to make a sustainable, reproducible, and manageable environment for learning" (Bergmann & Sams, 2012, p. 53). Lower-order thinking tasks become homework, saving face-to-face class time for student-centered challenges. Mastery is encouraged when students debate what each has learned face-to-face, in class.

When organizations learn as a team, outcomes are likely to improve (Senge, 2006). Everyone brings his or her ideas and strengths. Working in teams can create a learning environment in which solutions emerge (Bers, 2008, p. 19). The trading card game, which emphasized individual success, did not have a strong team dynamic. Conversely, the iterative process in the assistive technology project used teams much more effectively. The overarching goal was for every group to iterate until success was met. Each group should rotate around the classroom to serve as usertesters. The flipped classroom's debates were also team-based; stronger arguers coach those who require more refinement and practice. Having a lower batting average on a champion team still makes everyone a winner.

Mental models describe how individuals – and outside groups – perceive ideas. Each project hinged on the end users' experience. In essence, one's mental model is tested and revised until is better "fits" the needs of others. The trading card game and the assistive technology prototypes may have fit the researcher's mental model; however, neither was tested to assess if they functioned in their intended settings. The functionality of the flipped lessons was assessed by the designer, but not by students.

Because one can never anticipate unintended consequences, it is undetermined whether the students' experience will match the intended mental model. Only a cycle of tests, feedback, and iteration would promote the mental models to match the proposed need.

The classroom – like any learning organization – is stronger if there is a shared vision. Unlike a personal vision, a overall, common goal of an organization is considered. Shared visions "derive their power from a common caring" (Senge, 2006, p. 192). To play the trading card game – as well as the in-class debates – students would need to agree to rules. The game's objectives were designed to encourage student success. Coaching debate teammates to success, in a non-graded argumentation game, also showed a shared vision. When students play, they should partake in the shared vision to success embedded in the game's rules. Student-created assistive devices meet real world design challenges. It would be compelling to see the results in practice.

Systems thinking links the other four disciplines together. Thinking linearly presents an incomplete reality; systems thinkers view events as interconnected. After all, the world is comprised of complex and dynamic systems (Senge, 2006, p. 70). If an action is taken, it has more than a consequential effect; other events are set in motion. The trading card's game – not the tools used for its delivery (e.g., computer applications, art supplies) – was the focus of the class activity. The assistive device was a tool to teach iterative design, not the functions of switches. The flipped lessons, too, were a systemic change, shifting the lower-order skills to home. In all, care was taken to change the classroom system in a way to make it student-centered, not technology driven.

Keeping in mind the five disciplines and how each interrelates can turn a classroom into a successful learning organization. Student feedback should be constantly

assessed to create a conversation of participatory design. The result would be a classroom in which everyone strives continually to learn and grow at his or her best capacity.

References

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