CARD-tamen™ TPACK: Assessing Teacher Ability to Wisely Integrate Technology in the K12 Classroom

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Introduction

Amid a growing influx of smart devices, mobile phones, laptops, and tablets, the ability to seamlessly integrate technology and pedagogy has emerged as a crucial component of 21st century master teaching. In response, Koehler and Mishra (2009) developed the Technological, Pedagogical, and Content Knowledge (TPACK) framework to better define and catalogue the complex dimensions of technology integration as associated with innovative instruction and domain expertise. The authors have expanded upon Koehler and Mishra's vision by adding the context of contemporary learning theory and adapting a commercially available card game, *CARD-tamen*™, such that players (i.e., practicing educators) can externalize their knowledge concerning issues commonly associated with TPACK. The authors anticipate that this approach will improve integration strategies at the intersection of Technology, Pedagogical, and Content knowledge and provide important assessment information for decision-making concerning in-service teacher program coursework.

Unpacking TPACK

TPACK serves as a framework for categorizing teacher knowledge of technology integration across three key factors: Technological, Pedagogical, and Content Knowledge (Koehler & Mishra, 2009). At the heart of the system is a dynamic and transactional relationship between content, pedagogy, and technology that yields a distinct outline intended to guide the overall improvement of technology integration and teacher performance (Figure 1).

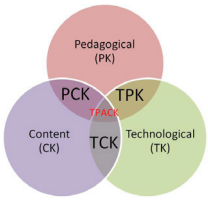

Figure 1: Transactional relationship between technological, pedagogical, content knowledge

While TPACK primarily aids the identification of teacher technology integration practices, technology coordinators (specialists in a leadership position that monitors a school's technology plan) benefit from using TPACK as a guide for the implementation of new district-wide technologies—helping educators, staff, administrators, and boards of education meet the standards and goals established under their respective district technology plans. Expanding this framework, we have added knowledge and understanding of major learning theories that operate to explain the TPACK integration, including behaviorism, cognitivism, constructivism, social learning theory, and situated learning.

A New Approach to Game-Based Learning

CARD-tamen™ and TPACK

Much of the literature steering game-based learning research has focused on video games, specifically, and the singular effects of gameplay (e.g., achievement, motivation) under sub-optimal conditions (e.g., games unavailable for replication research, small participant numbers) (Slota, 2014; Young et al., 2012; Young, Slota, & Lai, 2012). Studies focused on the benefits of a TPACK framework have been similarly limited and more driven toward theoretical implications than practicable application. In order to reconcile these issues, we have developed a research agenda that targets player intentionality and goal emergence through the examination of player-player, player-game, and player-environment interactions. By pursuing this line of investigation, it may be possible to establish a valuable, new stream of educational gaming literature that will emphasize learning outcomes, game affordances, and player intentions over and above one-dimensional variables that are mostly non-transferable from one gaming context to the next.

To achieve this end, we have chosen to modify a commercially available card game, *CARD-tamen*™, designed to help educators consider how games can provide evidence of teacher's thinking about technology integration in the classroom (http://www.practomime.com/cardtamen/cardtamen.php). The researcher-modified version encourages players to articulate technology integration strategies by elaborating on situations in which they must roleplay as technology coordinators tasked with offering a solution to a given instructional context. Winning relies on one's ability to integrate pedagogy, theory, policy, and technology, externalizing TPACK competencies in light of established master teaching practices and reflections on technology integration strategies.

CARD-tamen™ Redesigned for TPACK

As with standard *CARD-tamen*™ play, there are two roles in the researcher-modified version: judge (i.e., the individual who evaluates player competency) and player (i.e., individuals tasked with establishing the best possible argument for their CARDs). The game begins with one player acting as the judge and the others acting as technology coordinators—these roles rotate in a clockwise fashion after each round. At the start of a round, the judge announces a content objective of his/her choosing (e.g., teaching geometric proofs, identifying bacteria types). The content objective is then paired with a series of three face-up CARDs, one from each of three "suits" (i.e., Instruction, Theory, Challenge). Five CARDs from the fourth suit, Technology, are then dealt face-up in the center of the table. The player sitting to the judge's left has two minutes to examine the face-up CARDs, consider his/her approach to the content objective, and declare which Technology CARDs s/he will use to offer an instructional approach to the judge's content objective and the three face-up Instruction, Theory, and Challenge CARDs. This player then has up to two minutes to present his/her proposal to the group. After the proposal has been made, the remaining players may offer counter-proposals, spending up to two minutes presenting alternative approaches to the same problem and face-up Instruction, Theory, and Challenge CARDs. These counter-proposals need not rely on the same Technology CARDs chosen by the initial player, but they must use one or more of the five face-up Technology CARDs positioned in the center of the table. Once all proposals and counter-proposals have been made, the judge declares a winner and provides a brief explanation justifying his/her selection. The justification must be rooted in the technology integration strategies described by the TPACK framework.

Discussion & Future Research

Preliminary qualitative research conducted with university faculty and graduate students suggests that externalized thinking exemplified in the debate and discussions during game play may provoke the kinds of visioning and planning defined by the TPACK framework. This has led the authors to believe that games designed with similar structures and aligned with particular content area objectives can be used to support domain-specific teaching, learning, and assessment. If true, the game mechanics associated with *CARD-tamen*™ TPACK could be used to establish rich contexts for assessing the spaces teachers must navigate when attempting to foster learning environments that creatively and effectively draw on innovative pedagogies, emerging technologies, and rigorous content.

Additional investigation of the game's effectiveness for establishing player intentionality, goal-setting, TPACK, and learning theory application will be introduced to Master's-level educational technology students in July 2014. Ideally, this will complement the program's existing formative assessment e-portfolio tool and clarify how learning over the course of an educational technology program is directly applicable to real-world educational technology coordinator responsibilities. It is the authors' hope that both the game and the evaluation of its mechanics will become a fruitful avenue of game-based learning research as educational psychologists continue grappling with the difficulties associated with introducing effective games for learning in live classroom environments.

References

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