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## Videogames and Distributed Teaching and Learning Systems

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### Abstract

This poster develops a theory of *distributed teaching and learning systems* (DTALS) and provides two case studies using the videogame *Dota 2* and the game development program Twine. DTALS extends work on “Big ‘G’ games” and “affinity spaces” (Gee, 2003) with a particular emphasis on the teaching that occurs across a range of sites within and around videogames, and what that might tell us about teaching and learning more broadly. Furthermore, we are interested in understanding the relationships among these spaces, resources, practices, and people. Rather than viewing them as a haphazard collection of game-related teaching events or tools, we argue for understanding them as comprising a complex, dynamic, adaptive, and distributed *system*.

Young & Slota (2016) argue that researchers interested in the potential of games to support learning should attend not only to player-game interactions, but also to the “game ecosystem”, which they describe as interactions that emerge from game play but take place beyond the boundaries of the game. A game ecosystem has the potential to be quite vast, however, and here we propose the concept of “distributed teaching and learning system” as a means of directing attention more closely to the elements of this larger ecosystem that are organized around the purpose of teaching and learning. We wish to focus in particular on understanding *teaching* (and not “just” learning) as it is manifested and distributed across a wide range of spaces, resources, practices, and people. DTALS can support “learning pathways” to pursue deeper and richer learning experiences than what might be possible in isolation.

### Features of Distributed Teaching and Learning Systems

One challenge in adopting a systems perspective is setting boundaries on the system of interest. All phenomena can be studied through a systems lens (Wilensky & Jacobson, 2014); systems exist within larger systems and can take many different forms. Typical approaches to defining a system involve identifying the system’s *purpose*; we have identified teaching as the central purpose of DTALS. DTALS can vary in the extent to which the entire system is intentionally designed to support teaching and learning, and can be spread across things like fan sites, tutorials, and other tools beyond more “traditional” forms found within a videogame like tutorials or a “help” section (what Gee refers to as the “Game” and the “game”, respectively). These elements become interconnected as players move across

them, link them, direct other players to them—they build a system “from the bottom up.” In other words, such DTALS have *emergent* properties, arising out of the interactions of originally disparate elements.

Other attributes of DTALS, as we define them, are that they are *complex* (there are diverse, multi-directional relationships among elements), *dynamic* (the elements in a DTALS and the relationships among elements are constantly changing), and *adaptive* (DTALS respond to changes in the larger environment; for example, an update to a game might make some teaching resources irrelevant and lead to the creation of new ones). Accordingly, DTALS can be described only approximately and at one particular time. New people, resources, tools, and affinity spaces are continually entering the system, and elements within the system are constantly changing. Any one person typically interacts with only one portion of the system, and thus individuals will have different conceptions of the system and its parts. Lastly, these systems are *distributed*, where the teaching that takes place through DTALS is distributed across space and place, both real and virtual. Second, teaching is distributed across human and technical agents. Thirdly, teaching is distributed temporally, across time. There is always some kind of teaching available to the potential learner, often “just-in-time”, on-demand, or just-in-case.

## Example Systems

This poster includes two somewhat different systems below which will help us to illustrate features of DTALS. One of them, *Dota 2*, is a game “proper” with a robust player base and competitive esports communities; the other, Twine, is a text-based game development tool supported by many users across different websites and forums. We chose these examples because they cut across several important dimensions of DTALS (how they can be organized and designed, what people do with them, and so on) and demonstrate the variety and breadth of such systems in practice.

*Dota 2* is a multiplayer online battle arena (MOBA) game in which two teams attempt to destroy the opposing team’s base while protecting their own. Part of what makes *Dota 2* so interesting—and so illustrative of DTALS—is the many interrelated ways players can learn about the game and the communities of players, and how various sites are designed to teach them (Holmes, 2015). The game’s designer, Valve, included teaching-centered resources within the game (*designed* teaching elements). Valve also created somewhat unique features within the game client where players themselves carry out the teaching through a special coach mode, interactive player-created guides, and in-game streaming tools (*designed-for-emergent* teaching elements). Like many other games, *Dota 2* has spawned many “big G” sites beyond the game. These are sites created by players to teach others and where new players can go to learn about the game as well as about the communities of players around it (what we have called *emergent* teaching elements). *Dota 2* represents a rather strongly organized DTALS, with top-down, “sanctioned” elements like the in-game tutorial, as well as designed spaces for players to teach each other through the game client sponsored by Valve in addition to the many different affinity spaces that accompany so many other modern games. The game serves as a strong “anchor” with the DTALS.

Twine is a platform for authoring games and hypertext stories. This platform illustrates DTALS in several important ways that both compliment as well as contrast with *Dota 2*. First, the official materials offered for learning the platform are socially mediated, open for editing, and not the product of a single author. This stands in contrast to traditional teaching materials such as manuals and textbooks, but it also stands in contrast the top-down, designed systems around *Dota 2*. Second, Twine is a versatile platform

that is used by different people for many different reasons. For examples, seasoned game designers, novices who are using Twine as their first game design tool, and writers of interactive fiction all might use Twine and be part of the DTALS around it. Third, although the tool itself is rather easy to learn given the right materials, finding those materials and distinguishing relevant information from outdated information is no small task. The path of a learner through the teaching materials is a particularly interesting example of how a DTALS can be complex, requiring the learner to be self-directed in finding resources. Unlike with *Dota 2*, there is not a clear barrier between the designed and designed-for-emergent teaching systems.

## Implications

A DTALS model provides several tantalizing implications for rethinking our current understanding of both game-based learning and more traditional school-centered teaching designs. First, in a DTALS learners can encounter teaching elements and “on-ramps” to learning from many different directions and in different sequences; each learning pathway may be unique to each learner. Designers (of games and of teaching events) must account for the various ways “in” to the learning. Second, DTALS can support many different ways of using the system and different purposes for learning (such as the Twine example); designers, learners, and researchers must contend with potential conflicts between these different agendas as well as leverage the opportunity to potentially cross different interests in order to grow shared interest, passions, and knowledge. Third, since DTALS can be distributed across many different sites, learners must be particularly savvy when judging the reliability, usefulness, and connections between various sites. This is potentially difficult for novice learners, who must rely on strong “top-down” designs (like the “sanctioned” ones Valve provides in *Dota 2*) or through various other social channels. Finally, and perhaps most importantly, a distributed system implies that no single entity, institution, or individual has a monopoly on creating, disseminating, or controlling when and how teaching and learning happens. A DTALS model suggests instead that teaching and learning are all around us, and we should pay attention to who makes and uses all of the various teaching and learning sites in order to both design new and emerging learning opportunities as well as critiques and adjustments of existing models.

## References

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