HEARTHSTONE

Managing Randomness and Collectible Card Game Playing as Collective Cognitive Achievement

NICHOLAS PERSA, KURT SQUIRE & MIKE TISSENBAUM

Over the past twenty-five years, collectible card games (CCGs) have emerged as a cultural phenomenon. *Magic: The Gathering,* which is commonly regarded as the first in the genre, boasts a global player base of 20 million, a professional circuit with $240,000 in awards and a $50,000 cash prize to the winner. As a genre, collectible card games are defined as a game in which players purchase and collect cards which are then assembled into decks and played in head-to-head competition. CCGs typically feature a common "starting" set of cards, "booster packs" that expand the basic set and introduce new cards with particular powers (and differing rarity), and an ever-changing metagame, in which the community identifies superior card combinations and strategies for playing them. This metagame evolves as archetypal decks emerge and players identify weaknesses in it and counter them. Much like poker, hearts, or pinochle, CCGs can be played many ways, ranging from the casual to the competitive. The nature of collectible card games, which feature original artwork and collections of cards, mean that they also support unique modes of engagement, as a player may find pleasure in collecting (or even creating) cards. A truly global game, the top 10 Magic: The Gathering players (measured by all-time "Pro Points") come from five different countries (France, Japan, United States,

Brazil, and Germany), and the reigning lifetime cash leader, Paulo Vitor Damo da Rosa, has earned over $400,000 in cash prizes.

With the 2014 release of *Hearthstone: Heroes of Warcraft*, a CCG based on the World of Warcraft universe boasts over 70 million players globally, CCGs have fully entered the digital era. Playable on mobile devices and PCs, *Hearthstone* is free-to-play and approaching $400 million in revenue and has generated a healthy competitive scene as well; Hearthstone has awarded over $11 million annually in cash prizes, and the 2018 world champion Chen Wei-Lin (Taiwan) was awarded a cash prize of $250,000. Like Magic: The Gathering, Hearthstone is an international phenomena with a current top 10 player list hailing from 7 different countries (Czech, Russia, United States, Germany, Sweden, Taiwan, Denmark). The streaming outlet Twitch has been a key component to the game's success as an esport, as competitive players such as Trump report earning over $100,000 annually from subscriptions, advertising, and coaching.

The existence of competitive play with relatively stable players—with impressive money purses attached—suggests the competitive cognitive achievement to *Hearthstone* success. Whereas most competitive games are action games that rely more heavily on reaction times and physical movements, CCGs are turn-based, and therefore less dependent upon reaction time or precise mouse and keyboard movements. Although Hearthstone involves significant management of randomness (in terms of both which cards are drawn and the effects of particular cards) the list of Hearthstone champions is remarkably consistent and points to the knowledge and skill involved in competitive play. Players such as Kolento, Firebat, Trump (no relation), and Pavel appear time and time again in top ranks. With millions of players playing and 100,000s playing in competitions, the consistent success of particular players suggests that successful play is not random.

This paper examines Hearthstone in depth, asking, "What is the nature of Hearthstone expertise, and if it is a game system recruiting expertise, what kind of an expertise is it?" Consistent with the Well Played series more generally it seeks to unpack and communicate the experience of playing and learning Hearthstone, with a particular emphasis on the interplay among mastery of the game as a system, understanding how expertise forms, and the dynamic interplay among strategies. In addition to suggesting how such cognitive activity operates in *Hearthstone*, it seeks to document the ever-evolving ecology of cognitive resources that support play.

We argue that a core pleasure of Hearthstone is how it manages randomness and has made a competitive, skill-based game out of probabilities. Succeeding in Hearthstone requires mastering it as a semiotic system, understanding it as a system of probabilities (including the probabilities of your opponents overall goals and specific strategies), and then countering those moves with superior plays. Both the moment to moment gameplay and the overall game aesthetic is about making predictions based on knowledge of the system and probabilities ("What is my opponent trying to do here, what is my most likely next card"). The fact that Hearthstone has made a competitive game out of a dynamic that at its heart may seem counter to competitive play is an achievement. Educators in particular might take note of how Blizzard built a game around a concept notoriously difficult to engender in students.

PLAYERS AND METHOD

This paper builds on thousands of hours of gameplay across all three player-authors (as advised by Davidson, 2005). Each author plays Hearthstone competitively and typically places within the top 5% of players for the season, although each author has slightly different play styles, preferences, and history. Two of the authors have been playing since its release in 2014 with a

third joining in 2016. At different times, we have all played with different goals (from Arena, to competitive ladder play to unlocking "golden heroes," to constructing personally satisfying or unusual decks). This paper is the result of extended formal and informal discussions over this period, both face-to-face and through various channels (email, in game). Consistent with the Well Played format more generally, this paper proposal examines typical learning trajectories and observations on patterns of play, and is intended to make claims and generate theoretical models that others in the community may support, refute or challenge.

INTRODUCING HEARTHSTONE

Hearthstone is a card-based game played between two players in a turn-based format (see figure 1). Players meet at a table-top themed battleground as a selected class with a self-constructed deck of 30 cards. There are 9 classes to choose from, and each has their own unique abilities, playstyles and class specific cards (e.g., shamans use elemental spells and can summon totems; paladins cast buffs on their minions to make them stronger and give them special abilities; mages summon minions with unique abilities and can protect themselves from fatal damage with spells). Each hero is taken from the Warcraft universe and play on Warcraft lore (indeed the game itself is supposedly played in Warcraft taverns), although the game is also developing its own unique lore as well.

Figure 1. The digital tabletop battlefield. Players face each other and play minions and spells to affect the board state. The player's hand is at the bottom of the screen. Actions that can be taken are highlighted with a green border (e.g., playing cards or using a class hero power)

Each hero is designed to have a unique *playstyle* and *feel*. This playstyle is derived from 1) their "hero power," 2) class specific cards that tend to create particular kinds of interactions, and 3) the interactions of these elements that create archetypal decks. The hero power is a unique skill (i.e. hunters can do two damage to the opponent's hero, priests can heal any character for 2

points). Class specific cards reinforce certain styles of play, such as the rogue's "combo cards" which unlock new abilities when cards are played in combination. Finally, the combination of cards are designed to create an overall aesthetic "feel" to the character. For example, the aggressive (or aggro) hunter is designed to feel like a relentless attack on opponents, whereas a control priest is intended to feel like a defensive-oriented maestro that uses unique card combinations to stave off opponents before outlasting them. The warlock, which does damage to itself in order to draw cards is emblematic of the odd ways that cards interact as it frequently involves the player inflicting "self-abuse" to unlock special cards or abilities than then enable the player to concoct a miraculous victory.

Players craft a deck from their unique class cards and a pool of neutral cards common to all classes. Cards come in mainly two types: **minions** and **spells** (there are some specialty types, but for this paper we focus on only these two). Minions—elves, orcs, humans, kobolds, beasts, monsters, gods—are placed on the digital tabletop battlefield when they are "played." Minions can attack other minions as well as the opposing hero. Minions have health points like a hero, and will be destroyed when their health reaches zero. Spells can be cast to do things like draw cards from your deck, deal damage to minions and heroes, and buff up, weaken, or even transform minions. Players use combinations of minions and spells to affect the battleground and reduce the opposing player's health points to zero.

THE MATCH

Players begin a match with 30 health points and when a player's health points reach zero they lose. Players start by drawing a handful of cards and begin the game with a single mana crystal—a resource used to play cards. Every turn a player adds 1 mana crystal to their mana pool until they reach a maximum of 10 mana crystals. On any turn, a player can spend their mana

crystals from their mana pool to play a number of cards. Each card is labeled with a mana cost. At the beginning of subsequent player turns, the mana crystals refresh so they can be spent again. Matches begin by the hero avatars automatically greeting each other; players are then able to send expressive emotes during matches such as, "Hail, and well met!", "Well Played." and "Your suffering shall be … Legendary." These emotes, while rudimentary, do enable interaction, and customs about how and when to use emotes have emerged, with them taking on a certain degree of meaning in context.

MANAGING PROBABILITY

Chance, or managing probability is central to Hearthstone, and to some degree, the game is *about* predicting and managing probabilities. Drawing cards in a random order from a deck represents the most common form of chance in any card game. Although a player never knows what card will next be drawn from the deck (or the opponent's), game play is a constant process of making probably predictions on what those cards might be. For example, a very common card in the priest deck is the Northshire Cleric (shown right). Although it does not have especially powerful statistics, its special ability (enabling the player to draw a card whenever another minion is healed) *is* powerful, as it can be used to draw multiple cards early in the game. When playing a priest, it is common to "play around" this card, by anticipating its play and looking for cards or card combinations that can remove it from play. Thus, players manage chance by including cards in their own deck that are able to deal with this important early game threat.

Northshire Cleric

Whenever a minion is healed, draw a card.

As a digital game, Hearthstone has the ability to integrate chance and randomness in ways that are difficult in analog games. For example, generating a random random card or casting an effect onto a random target is difficult (although doable) in an analog game, but relatively trivial in a digital one. Through time,

Blizzard has included less truly random mechanics and instead integrated *choice* and *randomness*, so that a card may display 3 randomly generated choices for the player to choose from, which keeps each game unique and fresh while also making each choice more about skill (knowing which selection is strategically best) rather than simply chance. This interaction of randomness and choice has the second benefit of rewarding *situational knowledge*; choosing a good card in context requires understanding a player's goals, the other player's goals, and the overall situational awareness, rather than simply selecting a card based on its strength.

Single chance effects play an essential role in gameplay motivation and strategy development. Random chance ensures that matches between players are not rigidly predictable. The dynamics of chance interact with motivational competency and feelings of novelty. No player can master the fate of chance, which makes complete mastery in Hearthstone an evergreen challenge. For the newcomer, chance supports underdog plays and helps them learn while having fun. The chance mechanic maintains the flow theory channel between boredom and anxiety (Csikszentmihalyi, 1990). Without Hearthstone's level of chance, gameplay would get stale more quickly and lead to frustratingly hard matches for learning players.

Strategic players will need to take into consideration the probable, the unknown, and the near impossible. The space of play becomes a complex ill-structured problem that changes dramatically from match to match. The variance in play reduces the repetitiveness and widens the amount of working knowledge required to play successfully. Working towards mastery is a long process that feels rewarding when a player is able to predict the near impossible and beat their opponent. In the same vein, a crushing defeat from the unknown throws competency aside. The defeating emotion experienced from the unknown is valuable in providing variance in play. Hearthstone matches are

short and are not an ends all of player skill, the chance for excitement is balanced against strife.

WHY HEARTHSTONE FOR WELL PLAYED?

This work was inspired by Dan Norton's shared experiences with Magic The Gathering in Well Played entitled: "Magic The Gathering: A Learning Game Designer's Perspective" (2015). Hearthstone sits within the same genre as Magic and many of Norton's discussed relationships are equally meaningful here. This work aims to build on Norton's discussion about card game mechanics by leading it into Hearthstone's community activities. Hearthstone's activities predominantly use digital media to facilitate player development and interact with the game. YouTube, Twitch, Reddit, and fan-sites add a noteworthy level of game interaction into the Hearthstone experience.

The level of integration between community digital media and Hearthstone is indispensable; the game is measurably defined by the interactivity. Interweaving game design with digital media practices characterizes gameplay as a complex system and questions what players are doing and why they are doing it. This linkage creates a discussion about how game design mediates community development. The direction of this conversation helps designers become aware of how players act outside the game, but in direct reference to it. Likewise for educators, they can see how a game system and its players form knowledge communities around complex content, which can lead to new innovations in schooling and cognitive development. Essential Hearthstone knowledge is described next and then connected to the communities that form around it.

THE FIELD OF PLAY

A quick introduction into the Hearthstone field of play. A deck consists of 30 player selected cards. Both players automatically draw a card from their decks at the beginning of every turn. All

cards have a mana cost associated with them. The distribution of a deck's mana costs is called the **mana curve—**a bell shape is common. The player to go first starts with a hand of 3 cards. A player going second starts with 4 cards and a special 0-mana cost spell called the **coin**. When a player casts the coin spell, they generate 1 additional mana crystal that can be used for the given turn. The coin allows a player to play costly cards or multi-card combos turns earlier. The advantages of 1 additional mana and 1 extra card given to the second player account for the disadvantage of going second.

There are 3 phases to a match: **early**, **mid**, and **late game**. Early game plays are limited by the number of mana crystals available. Each player begins a match with a single mana crystal and gains another crystal at the beginning of subsequent turns. Hearthstone's resource mechanic mediates how players build their decks while also creating a paired resource between the players. Each player will be able to make similar strength plays as turns pass. Deck building needs to consider the mana cost of each card as well as the number of cards in the deck that have that cost. A deck with too many high cost cards will not be able to make early plays, which can lead to being overrun. A deck with too many low cost cards might lose as the gameplay transitions phases and the opposing deck starts playing both high cost and power cards. Playing cards that cost the same number of mana crystals available is called **playing on curve.** Stronger cards have higher mana costs, so playing on curve is associated with making the strongest possible play. Mid and late game plays have more mana crystals available, which allows multi-card combos and costly cards that dramatically affect the battleground. Beginning on the 10th turn, 10 mana crystals can be spent to play combinations of cards that have game ending effects when played concurrently.

When a card is played, it can be assessed for **tempo** or for **value**. Playing for tempo means that out of all plays currently possible, the player is making a play to maximize damage—even if its 1 damage or 15—it's whatever pushes the most damage. Tempo plays need to be countered by the opponent immediately or can lead to a loss. Tempo introduces the concept of **trading**. Trading means that a player uses a combination of spells and minions to counter a tempo play made by their opponent. Players need to determine whether countering an opponents play is correct. If an opponent's tempo play is weak, then by trading with it a player risks losing the match. Decks are limited in resources and inefficiently playing resources can only lead to one result—defeat. Playing for value means that the player is generating additional cards (randomly or from their deck) or is organizing a future tempo play. The key difference in a value play, is that no response is needed by an opponent. A value play minimizes the current turn's damage potential for later damage in some future turn.

The key terms introduced create the basic dynamic of play. As players become fluent in these actions, they begin to master the most demanding aspect of the game—understanding a matchup. A matchup is the comparison of cards and possible actions between opposing players' decks. When thinking of matchups in Hearthstone, many competitive players refer to "Who's The Beatdown?" by Mike Flores, a long-time professional Magic player and strategy writer (Flores, 1999). In the Flores framework, a player is termed the beatdown when their deck affords the ability to deal more damage to minions on the board and the opposing player—a tempo dominant playstyle. A player is labeled control if they have more options to prevent damage, counter plays, and stall the game than the opposing player—a value centric playstyle.

There is more to this conversation than these two labels, but it presents a good starting point. The beatdown deck is going to rely heavily on tempo and optimize damage output per turn, while the control deck wants to optimize counter plays with a mix of value and tempo. A note on tempo plays made by a control player. Since tempo needs to be countered or can lead to a loss, a control player can make a tempo play to behave as a counter play. If the tempo play is strong enough, the beatdown player is forced to deal with the situation or risk a loss. In this case, the strength of a counter play is determined by the difference in the tempo play between control and beatdown.

CAN YOU SHOW ME THE WAY?

Players have adopted the roles of teacher, mentor, and guide for essential Hearthstone knowledge. A well-known introductory digital media series is called Trump Teachings. The series introduces concepts of gameplay and discusses the technical aspects to matchups. The series is made by Trump, a professional Hearthstone player, who creates digital media on YouTube (800k+ subscribers) and streams live gameplay with commentary on Twitch (800k+ followers). Trump is one of many who create such media on both YouTube and Twitch. Other resources include websites with writers and analysts that create learning material: What's the Move? (see Figure 2), matchup guides by the week (see Tempo Storm in references), and specific card play statistics (see HSReplay in references). *What's the Move* dissects a single turn in a Hearthstone match that involves intricate thinking about value, tempo, and counter plays. *Matchup guides* discuss core deck strategies, logic behind card selection, optimal plays to look out for, and how a deck plays against others. For *play statistics,* a number of sites use data from ~180k Hearthstone (at the time of writing this paper) players to assess gameplay through metrics, global patterns, and recordings of games between players. Analytics inform player discussion and motivate a deeper involvement in learning how to play optimally.

Hearthstone communities and content are diverse and often tailored to particular aspects of the game. Three communities will be described: casual, arena, and ranked.

Figure 2. "What's the Move?" instructional series sets up a situation for players and discusses various options of gameplay. In this case, three different play sequences are labeled with a number and described. The audience is given 30 seconds to decide which play they would choose and why. After the reflection time has ended, the video discusses at length the play options and explains which play is the strongest given the context of the match.

CASUALS

Joining the casual clan is a way of engaging with the game that is based on fun, experimentation, and discovery. A casual's goal is not always to win, or make the highest level decisions, but to connect with others by *playing* through interesting mechanics. Hearthpwn.com is a deck sharing platform serving Hearthstone's diverse player base, but also supports the largest community of casuals who share decklists and strategies. A critical aspect to this mode of play is that casuals typically make their own decks or test personally modified versions of a deck. Casual play contrasts with competitive play, where netdecking norms result in near exact copies of high performing decks. Personally crafted decks use different cards than what players are used to but rely

on the same game mechanics. This difference in play structure translates into a difference in how the game mechanics are cognitively represented through the cards (Turkay, Adinolf & Tirthali, 2012). The specific player chosen cards have uncommon playstyles, mana costs, and game states. The shifting context takes the complexity of tempo and value and frames the problem into a varied representation, giving the learner another angle to understand complex mechanics (Cunningham & Duffy, 1996; Hannafin & Land 1997). Here casual players can see game sequences of tempo and value under various conditions and refine their knowledge about the game.

ARENA CHAMPIONS

Nothing like a bit of money on the line to get the blood pumping. Arena is a guild of players that draft their decks from random selections of cards and then compete against each other to demonstrate drafting knowledge and skill to process unpredictable situations. In order to participate in arena, a player buys an in-game entry ticket using the in-game currency. For every match the player wins, a counter on the ticket increases by one. Once the ticket reaches twelve wins, the player is showered in valuable rewards. If a player receives a total of three losses at any point, the arena run is over and the player is rewarded based on the number of wins achieved. After an arena ticket is purchased, the deck drafting process begins. During a draft, a player is shown three random Hearthstone cards and is allowed to pick one to add to their deck. The three to one drafting process is repeated until the player has a 30-card deck. Part of the arena experience is luck, and some player drafts result in decks with higher quality cards than other players.

Drafting a 30-card deck is very complex. A successful deck needs an appropriate mana curve based on the chosen cards, a cohesive beatdown or control plan, and synergies to make strong tempo | value plays. In order for players to learn Hearthstone's complex

systems, they need to make core concepts explicit, collaborate in socially relevant gameplay, test their mental models, and continuously observe the game in various contexts (Jacobson et al., 1999). Scaffolding is deeply connected in this process, where learners are on the boundary of their knowledge and need support from peers and experienced players to reach new levels of performance (Vygotsky, 1978). The Hearthstone community highlights exactly this interplay between knowledge bearers, the interactive media they create, and inexperienced players participating with those content creators and developing their own negotiated meanings.

External game communities are not often the focus of game design but imperative in understanding the gameplay itself. In these communal affinity spaces, players are mutually engaged in complex and diverse activities, working towards a collective negotiated meaning, with a shared repertoire of tools, practices, words, stories, and concepts—forming a community of practice (Lave & Wenger, 1998). Key contributors to the arena community are Adwcta and Merps, who produce multi-hour digital media on YouTube that discusses a drafting process and the subsequent arena run. A common practice among arena content producers is to use Twitch while recording the video for a YouTube upload. During a Twitch stream, the audience—many of whom are Hearthstone players—ask questions about the draft picks and matchup strategies. TheLightForge.com, maintained by Adwcta and Merps, is a list of all draftable cards available to arena players and can be organized by various filters. Arena players use this tool to support their understandings when drafting a deck.

RANKED PLAY AND BECOMING LEGEND

Reaching a high rank in Hearthstone takes hundreds of matches and is an ultimate showcasing of skill, knowledge, flexibility, and commitment. At the end of every month, a season of ranked

play ends and all players' ranks are reset for the next seasonal month. There are 25 ranks in Hearthstone and moving down the ladder to rank 1 is the challenge. Beating the best of the ranked 1 players is rewarded with the status of Legend—a feat 0.5% of players accomplish every season (Zeriyah, 2014). Every win on ladder increases the quality and experience of the opponents a player faces. With both experience and understanding high among players, a single error can result in a complete loss.

Many professional players produce live streams on Twitch and digital media for YouTube. The content has the same scope mentioned with *Trump Teachings*—they examine game states, discuss the complexity of plays, and interact with their audience. Pros also interact with each other in this medium by remixing deck ideas and sharing their experiences. The professional side of the community practices a component of knowledge building, where players collaborate and produce epistemic artifacts—streams, videos, tools, guides—that lead to the creation of newer knowledge (Scardamalia & Bereiter, 2006). The audience side behaves as a community of learners, interacting with these artifacts and taking part in apprenticeship from pros, leadership in teaching other players and friends, navigating the breadth of support, and continually reflecting on and discussing the differences between their plays and the pros (Rogoff, 1994). The player FenoHS organizes a popular series on Twitch. In the multi-hour stream, professional players stage a best of 11 matchup. Two players take control of the decks and a sideline of pros discuss and breakdown the matches. Alongside the experienced commentary, audience members ask questions, suggest alternative plays, and reflect. Cognitive articulation is not directly transferred into the heads of the eager players, but they can makes their own play comparisons, challenge the pros' actions, and reflect on the information to construct personal meaning (Jonassen & Rohrer-Murphy, 1999). Actively working through problem states and reflecting on them is a well

recognized component to many learning pedagogies. The community, year over year, is developing rich resources and connecting its players to each other.

UNDERSTANDING GAMES

Mainstream gaming culture has been growing steadily over the decades. What we play now is fundamentally different from what we started off playing. The rising design patterns in complexity, depth, and sociability can transform a singular and tangential play session into a life's purpose. Ok, maybe we don't all dedicate our lives to games, but engaging with them in a serious manner is increasingly common. Performing in and contributing to today's games requires high levels of competence and cognitive development—involving hours of study, planning, and persistence.

The idea of the gamer life is nothing new, *chess* and *go* are two examples that have been around for centuries. In these historic games, players have dedicated lifetimes of practice and learning to demonstrate a public mastery over an ill-structured problem space. In fact, the rise of such master chess players inspired years of technology research in developing artificial intelligence to beat them—a superhuman challenge. This Well Played Hearthstone exposition motivates a critical concept that should guide how we think of game design and envision the player. Steinkuehler (2006) succinctly and powerfully captures this concept in a brief piece:

"Games are designed experiences (Squire, 2005), and as such, their study requires an understanding of the full range of human practices through which players actively inhabit those worlds of rules and texts and render them meaningful. Games are a "mangle" (Pickering, 1995) of production and consumption—of human intentions (with designers and players in conversation with one another; Robison, in press), material constraints and affordances, evolving socio-cultural practices, and brute chance.

Whereas rules and stories partially constitute the designed object or little g game at the center of a given individual's play experience with it, it is the emergent culture or big G Game around them that renders them meaningful and consequential (Games and Professional Practice Simulations Research Group, 2005; Gee, 1999; Shaffer, in press; Squire, 2002; Steinkuehler, 2005)."

The Hearthstone player communities and activities depicted here paint a passionate reality of g/Games. The little g game of Hearthstone is found in the cards themselves and how players navigate matchups and choices. Players play cards to interact with other mechanics and seek victory through mastery. The big G game is found in the rich material that enrobes the entire context of Hearthstone. Meeting and networking with players, building decks, learning in all manner of spaces and places, organizing public forums, negotiating meaning, and defining what it means to belong to the Hearthstone community.

REFERENCES

Blizzard Entertainment. (2014). Hearthstone [computer & mobile video game]. Irvine, CA.

Csikszentmihalyi, M. 1990. Flow: The psychology of optimal experience, New York: Harper & Row.

Cunningham, D., & Duffy, T. (1996). Constructivism: Implications for the design and delivery of instruction. Handbook of research for educational communications and technology, 51, 170-198.

Davidson, D. (2005). Plotting the Story and Interactivity of the Prince of Persia: The Sands of Time. Delivered at the Media in Transition 4, MIT, Cambridge, MA. 12.

Flores, M. (1999). Who's The Beatdown? Retrieved January 19,

2018, from http://www.starcitygames.com/magic/fundamentals/3692_Whos_The_Beatdown.html

Hannafin, M. J., & Land, S. M. (1997). The foundations and assumptions of technology-enhanced student-centered learning environments. Instructional science, 25(3), 167-202.

Jacobson, M., Kaput, J., Bar-Yam, Y., Jakobsson, E., Lemke, J., & Wilensky, U. (1999). Complex systems and education: Cognitive, learning, and pedagogical perspectives. Planning Documents for a National Initiative on Complex Systems in K-16 Education.

Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. Educational Technology Research and Development, 47(1), 61-79.

Lave, J., & Wenger, E. (1998). Communities of practice. Retrieved June, 9, 2008.

Marinconz, S. (2014). Here's How Rare Hearthstone Cards Actually Are. Kotaku.com. Available at: https://kotaku.com/here-are-the-actual-hearthstone-legendary-card-drop-rat-1586156518[Accessed 23 Jan. 2018].

Norton, Dan (2015). Magic The Gathering: A learning game designer's perspective. Well Played—Vol. 4, No. 1, 193-205

Rogoff, B. (1994). Developing understanding of the idea of communities of learners. Mind, culture, and activity, 1(4), 209-229.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary educational psychology, 25(1), 54-67.

Scardamalia, M., & Bereiter, C. (2006). Knowledge building. The Cambridge.

Steinkuehler, C. A. (2006). Why game (culture) studies now?. Games and Culture, 1(1), 97-102.

Turkay, S., Adinolf, S., & Tirthali, D. (2012). Collectible card games as learning tools. *Procedia-Social and Behavioral Sciences*,*46*, 3701-3705.

Vygotsky, L. S. (1978). Mind in society: The development of higher mental process.

Zeriyah. (2014). Hearthside Chat – You're Better Than You Think! Retrieved January 19, 2018, from https://playhearthstone.com/en-us/blog/15955974/hearthside-chat-youre-better-than-you-think-9-18-2014

MEDIA LINKS

Trump Teachings (YouTube content series). https://www.youtube.com/ watch?v=2KjtRokhpvM&list=PLvEIxIeBRKSjprrvlbAcbVjzHsnH9PjDX

What's the move? (YouTube content series).https://www.icy-veins.com/forums/topic/35396-whats-the-move-13-a-beginner-friendly-episode/

Tempo Storm. https://tempostorm.com/hearthstone/meta-snapshot

HSreplay. https://hsreplay.net/meta/

Hearthpwn. http://www.hearthpwn.com/

TheLightForge. http://thelightforge.com/TierList