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The value of time together: a longitudinal investigation of mentor-protégé interactions in an online game

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Abstract

Purpose – The study aims to determine the outcomes of mentorship in an online game system, as well as the characteristics of good mentors.
Design/methodology/approach – A combination of anonymized survey measures and in-game behavioral measures were used to power longitudinal analysis over an 11-month period in which protégés and non-mentored new players could be compared for their performance, social connections and retention.
Findings – Successful people were more likely to mentor others, and mentors increased protégés' skill. Protégés had significantly better retention, were more active and much more successful as players than non-protégés. Contrary to expectations, younger, less wealthy and educated people were more likely to be mentors and mentors did not transfer their longevity. Many of the qualities of the mentor remain largely irrelevant—what mattered most was the time spent together.
Research limitations/implications – This is a study of an online game, which has unknown generalizability to other games and to offline settings.
Practical implications – The results show that getting mentors to spend dedicated time with protégés matters more than their characteristics.
Social implications – Good mentorship does not require age or resources to provide real benefits.
Originality/value – This is the first study of mentorship to use survey and objective outcome measures together, over time, online.

Keywords Mentorship, Protégé, Online game, Social cognitive theory, Online community
Paper type Research paper

Mentoring is traditionally defined as the relationship between an older, experienced mentor and a younger protégé, typically in a workplace context, with the goal of furthering the protégé's career (Ragins and Kram, 2007). Mentors in work settings are often experienced, older, well connected and wealthier individuals (Allen, 2003) who provide significant advantages to their charges (Eby *et al.*, 2013; Underhill, 2006). As technology and workplace settings have evolved, it is fair to ask if this continues to be the case. Who tends to become a mentor, and who is actually good at it? What are the key benefits for the protégé? Do these relationships exist in new and emerging settings, especially as our communications become more technologically mediated?

The organizational communication and business literature on mentorship is well developed, yet has historically focused only on the workplace (Ragins and Kram, 2007).

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However, mentorship may take place in a wider variety of contexts as disparate as online education (Adams and Hemingway, 2014) and orphanages (Onuoha *et al.*, 2009). Germane to this research, there are studies directly examining games directly for their potential as learning tools (Arnseth *et al.*, 2018), as sites of study for teams (Reeves *et al.*, 2017) and even some work exploring mentorship (Rusk *et al.*, 2020). That work is largely (though not exclusively) focused on the processes of the dialogical interactions and the meanings made by the players, i.e. "how does this happen?" while the organizational and business literature often focuses on causality and generalizability of findings, i.e. "does this work, for whom and how much?" While both goals are worthwhile, this research is in line with the latter set.

The current research seeks to strategically bridge these two sets of literature, borrowing the goals of the organizational work with the context-specific learnings of the game studies literature, while employing a novel methodology for both. Accordingly, rather than a formal workplace, the setting of this research is a large-scale online game. With a few exceptions (e.g. Hung, 2009; Rusk *et al.*, 2020), there has been little attempt to systematically measure the outcomes manifested in the relationship between mentors and protégés in online games at scale. This game, *World of Tanks*, is a team-based multiplayer game in which random, semi-permanent and permanent teams battle for 15-minute sessions. Convenient for the purpose of this research, *Tanks* features a built-in mentoring system coded into the game's social architecture. That architecture is also deep, supporting a wide range of player interactions and team structures. The most experienced *Tanks* players have played for up to 10 years and more than 70,000 battles, and "clan" team structures enable groups to maintain themselves, organize, recruit and skill up to win and acquire more resources. New players are valuable to these clans and must be nurtured through a particularly difficult new player experience. Although no one will mistake an action game for a workplace, there are some high-level analogs in play. Like a workplace, the game has tasks, leaders, followers, formal and informal groups and clear goals around winning and losing. In some senses, it functions like a workplace but with better transparency and lower financial—if not always psychological—stakes. Unlike a workplace, *Tanks* provides a setting for examining mentorship in which a large number of factors are unobtrusively observable.

As a non-workplace context, it is fair to ask whether the existing organizational literature applies to such settings, and whether these settings are worthy of investigation independent of prior workplace-centric research. Although there is some "mapping" (Williams, 2010) between this setting and workplaces, the sheer scope of online gaming in everyday practice makes it an important setting in its own right. Gaming has become the dominant communication platform of the world. The global game market is now the largest of all media, generating $147.5 billion in 2019 (Wijman *et al.*, 2020). Compare this to TV ($105 billion), film ($41 billion) and music ($17 billion) and gaming almost equals all three combined (Oppenheimer Funds, 2018). Additionally, as COVID-19 kept people in their homes and online, these numbers increased by an estimated 30–47% across platforms (Perez, 2020). Gaming has overtaken all other media combined and has become a key site for socialization processes (Fox *et al.*, 2018).

By combining unobtrusively tracked in-game behaviors with survey data, this research is able to address central questions of the workplace mentorship literature, while drawing on the insights of gaming-centric research.

Literature review

Mentorship literature often acknowledges that the research struggles to keep pace with our rapidly changing workplaces and technology-driven contexts. As Ragins and Kram (2007) noted in their systematic review of the research on mentoring, "... we know it works; we are still grappling with why, when, and how" (p. 4). Studies on mentors and protégés find that there are motivations and benefits for each group (Kram, 1985), as well as some understanding of the process and settings of the relationship (Eby *et al.*, 2013). The research is well-theorized, with the

initial work benefiting from an infusion of new theories from networks, communication and psychology (Ragins and Kram, 2007; Tonidandel *et al.*, 2007).

To understand who might become a mentor, the research has typically started with why anyone would spend their time helping others, and what characteristics they might have (Hunt and Michael, 1983). Mentors are motivated by both extrinsic (e.g. money) and intrinsic (e.g. satisfaction) rewards (Hezlett and Gibson, 2007). Mentors can improve their own performance, advance faster, learn from protégés and gain greater visibility in their organization (Newby and Heide, 2013). The intrinsic benefits can include higher satisfaction and enjoyment (Allen *et al.*, 2006; Hezlett and Gibson, 2007; Wanberg *et al.*, 2003). Benefiting oneself and another are not mutually exclusive motives (Allen, 2003).

The context of the current study includes a similar combination of intrinsic and extrinsic benefits. Mentors have been found to have particularly prosocial personalities and are motivated to help others satisfy their needs (Allen, 2003). While researchers tend to focus on older mentors, who are in a life stage more likely to support giving back (Korndörfer *et al.*, 2015), there is also a contrary literature showing that the wealthy are not as generous as we might expect. In fact, poorer people are systematically more generous (Côté and Willer, 2020; Stamos *et al.*, 2020), which might carry over to more effort spent mentoring.

The benefits to the protégé seem much clearer, from the standpoint of psychosocial support and career development (Kram, 1985). Meta-analyses (Eby *et al.*, 2013; Underhill, 2006) have found that there are a wide range of positive outcomes, ranging from better performance, attitude, health, relationships and career outcomes. Similar outcomes were found by qualitative reviews (Wanberg *et al.*, 2003). This process regularly scales; more mentorship leads to more of these outcomes (Allen *et al.*, 2006). Critically for the tests below, Tonidandel *et al.* (2007) found that the duration of the relationship was a key predictor of protégés' performance.

These processes are predicted in the literature on social cognitive theory (SCT, Bandura, 1994). According to SCT, the basis of learning is the observation of a role model, followed by practice and guidance. Here, the protégé watches the mentor to learn how to improve performance in the game and navigate its social world. Therefore, a good role model who makes a consistent effort should predict a good protégé.

SCT and the online game setting

The game *World of Tanks* is a competitive, team-based battle simulator featuring teams of tanks playing a series of short contests. Teams are structured with leaders and followers in clans that operate hierarchically. Clans have experienced "commanders" and "officers," while new players are "recruits." *Tanks* also has a built-in mentorship structure, advertised as the Referral program. Newby and Heide's (2013) workplace-based definition of mentoring fits well in this game's context: "although program formats and subject matter vary, the overall goal is common: To efficiently and effectively develop the knowledge, talents, and skills of a less experienced person through individualized attention from someone with more experience and knowledge in a given area of expertise" (p. 141). Because the early game experience of *Tanks* is especially challenging, the game's publisher, Wargaming.Net, sought to leverage its veteran players to help "newbies" up the learning curve. In doing so, the game incentivizes modeling behaviors, direct and vicarious reinforcement, attention, information, productivity, motivation and self-efficacy, in the framework of SCT (Bandura, 1994). SCT has been used many times to understand gamer behavior (Van Rooij *et al.*, 2017); "Based on this theory, a player modifies their thoughts, reactions, and behaviors to match another player in order to maximize their potential, gain rewards or other valuable outcomes, such as building social bonds or boosting self-esteem" (Kahraman and Kazançoğlu, 2022, p. 6).

Beginning in February 2019, experienced players were given the ability to invite friends and to team up with them. Once linked within the game, both the mentor and protégé were given a chart of rewards for playing together—providing direct and vicarious reinforcement in exchange for attention, information sharing and productivity. The developer's goal was to foster learning and socialization. This incentive scheme parallels Allen's (2003) win-win motivational pluralism: both mentor and protégé gain more in-game rewards the more they pair up. Because *Tanks* is a match-based game, sessions typically last for many matches, meaning that the pair will spend time together before, during and after the matches and will likely also socialize within broader teams and clans. A mentor and protégé who run through the entire program may spend dozens to hundreds of matches together over a series of weeks or a handful of months. This is likely a social process in which both teacher and learner make meanings and discover processes as they go, in dialogical fashion (Arnseth *et al.*, 2018), as opposed to players reviewing their own play sessions by themselves (Kirschner and Williams, 2013). As an example, a novice tanker does not know the value of hiding and angling a tank properly behind cover, but an expert will immediately do this. A protégé will likely observe this, and/or be shouted at for wandering out into the open. This intense interaction over time allows for SCT's paths to learning and growth through both direct guidance and observational modeling. However, prior research on collaboration in gaming has also found null results in knowledge gain (van der Meij *et al.*, 2011), so this learning is not a given.

As protégés spend time with their mentors, they observe and practice both technical and social skills. It is worth noting that skills among game players are highly cultivated and that expertise goes beyond the more obvious domains of reflex and speed and into knowledge, tactics, experience and strategy (Reeves *et al.*, 2009). *Tanks* creates a strong need for attention and motivation, key to social learning, by being a particularly unforgiving game. Since *Tanks* pits inexperienced players against veterans immediately following an introductory tutorial, new players usually lose early (removing their tank from the active battle until it ends) and find it difficult to learn how to compete and advance. This results in high dropout rates among new players. From the standpoint of SCT, it is reasonable to assume that protégés will thus be highly motivated to pay attention to their mentor's playstyle, which can be observed even after the protégé's tank is destroyed, in order to learn skills even when they are unable to participate directly. Through this process of social learning, the mentor-protégé relationship may also promote new player retention by smoothing the learning curve. While new players are likely to repeat mistakes, with reinforcement from mentors, they can learn from their errors and obtain new strategies.

Good SCT processes require a sense of self-efficacy, which Bandura defines as the belief "in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). This is the direct goal of the Referral program. The developer designed the process so that by the end of the mentorship period, protégés will be independent both on the battlefield and within its social architecture. These are the ideal conditions as laid out by SCT, but of course we should expect variance. Players who are not motivated or fail to retain information are less likely to thrive. While we cannot observe some factors directly, we can assume that the more time the mentor and protégé spend together, the more likely the protégé is to retain information and stay motivated.

Team dynamics within games are increasingly well understood (Fox *et al.*, 2018; Musick *et al.*, 2021; Shen, 2013) and offer strong parallels to highly competitive workplace settings. Players perceive and act as though online and offline resources are equivalent (Castronova *et al.*, 2009), care about and work in teams similar to offline groups (Huynh *et al.*, 2013). Similar to competition among and within many firms, the game world is competitive and zero-sum. The martial setting and style of *Tanks* teams parallels competitive corporate, sport and military contexts and is common among many games with long-term team structures (Williams *et al.*, 2006).

Research questions and hypotheses

There are three general questions that come from the literature to date: (1) Who is more likely to be a mentor? (2) What are the outcomes of mentorship? and (3) Do mentors transfer their positive traits (e.g. skills and longevity) to protégés?

As noted above, older, wealthy and successful people, as well as those with prosocial characteristics are most likely to self-select as mentors (Allen, 2003). Mentors are also theorized to be more oriented toward empathy and helpfulness, even after accounting for age. Because mentors are often motivated by both intrinsic and extrinsic rewards, it is unclear if they will adhere to these predictions in a context where the rewards are especially clear, objective and outlined. So, we ask the general question:

RQ1. What background factors are associated with becoming a mentor?

The literature uniformly predicts positive outcomes from mentorship as supported by SCT. Therefore, the basic hypothesis is

H1. Protégés will have more in-game success than non-protégés.

Among the other benefits of mentorship, prior work (Allen *et al.*, 2006; Lankau and Scandura, 2002; Underhill, 2006) has found that mentorship leads to a small but inconsistent intention to stay in an organization and remain active. Similarly, increasing self-efficacy predicts greater confidence and employee retention. Hezlett and Gibson (2007) called for additional research utilizing different designs to follow up on this premise. Long-term longevity in video games is consistently low. New players often drop out at rates approaching 75% within the first day of play (Verani, 2020). Long-term retention on the scale of months is typically only a percent or two of players. As such, we predict that protégés will have relatively better retention than non-protégés:

H2. Protégés will be more likely to stay in the game than non-protégés.

H3. Protégés who stay will be more likely to be active in the game than non-protégés.

The literature offers predictions on which mentor-protégé pairs will have better outcomes. There is consistent support for the notion that spending time is valuable and leads to more support (Baugh and Fagenson-Eland, 2005; Chao *et al.*, 1992; Tonidandel *et al.*, 2007). Therefore:

H4. Mentors who spend more time with their protégés will generate more success for them.

Given the strong findings on time spent cited above, we investigate this additional hypothesis:

H5. Protégés' longevity will increase with the time the mentor and protégé spend together.

The last set of hypotheses relates to the transfer of properties from mentor to protégé, chiefly skill and longevity. In the context of gaming, skill is a key property that can be measured more easily and objectively than in other contexts. Drawing on SCT, it follows that a player watching a successful role model will develop successful techniques themself. Therefore, we expect that

H6. More skilled mentors create more skilled protégés.

Because retention is a valued outcome in organizations, it is worth exploring whether skilled mentors help retain protégés over time. Thus:

RQ2. Will mentors with higher skill have protégés with more longevity?

Lastly, according to Ensher *et al.* (2001), experienced mentors should have better outcomes compared to less-experienced ones. They found that mentors with more longevity have protégés with more longevity, or intention to stay, as well as protégés' job satisfaction and perceived career success. Therefore:

H7. Mentors with higher levels of longevity will have protégés with more longevity.

Method

Data were collected from the game *World of Tanks*, a very challenging first-person perspective competitive online tank-battle game in which teams of 7–15 players battle each other in 15-min matches. The methods here were reviewed and approved by the Institutional Review Board at the University of Southern California, file #UP-19-00138.

Beginning in February of 2019, *Tanks* initiated a reboot of their mentorship program titled "Referral 2.0." This reboot enabled a natural quasi-experiment (Cook and Campbell, 1979) that we leverage for research purposes. Referral 2.0 is a marketing program that seeks to pair its experienced players with their friends who have not yet played. Experienced players were able to invite up to three friends into the game with unique referral codes. If accepted by the new player, the mentor (known as "Commander" in the game) and the protégé (known as "Recruit" in the game) were paired and enabled to communicate and play together. Each part of the pair was given in-game rewards of experience points, cosmetic rewards and eventually new tanks, all at a pace roughly double what is typical. Getting to the more enjoyable areas is usually accomplished with either time or money (Thomas, 2005), this system circumvented both. These rewards were dependent on the protégé's progress and accelerated when the mentor and protégé played matches together.

The analysis here focused on players who joined the program in February and March of 2019 and followed them and their mentors over the next 10–11 months, through December of 2019. With the cooperation of the game's publisher, Wargaming.Net, we collected both survey data and matching behavioral data from the game's server logs, i.e. for all mentors we had their self-report measures as well as their in-game actions, and for all protégés, all in-game actions. From April 16 to 18, 2019, a large-scale online survey was sent to 19,490 active *World of Tanks* players who had played more than 200 battles. A total of 4,436 responses were collected for a response rate of 22.8%. All answers were anonymized. Survey respondents' behavioral server log data were retrieved from Wargaming's data warehouse. The behavioral data were then matched with the survey data using unique keys assigned to each player. These keys were hashed by Wargaming so that neither the investigators nor the company could retroactively attach analyses to real-world identities. A significant value of this research is that the data have self-report variables for demographic and affective concepts, but also have objective behavior-based measures (see below) that were entirely unobtrusive to the subjects involved and therefore could not generate additional social desirability errors from the presence of the investigators (Webb *et al.*, 1966). As most of the mentorship literature is driven by only self-reported data, this is a significant contribution to measurement.

Of the 4,436 players, a subset of 434 players had registered for the mentorship program and were retained and used in the analysis. Several analyses outlined below are focused on mentor-protégé pairs over time and had three forms of variance that made the sample size vary. Firstly, mentors could have up to three protégés at a time. Each mentor-protégé pair was treated as a separate entry for analysis. There were 536 protégés in the data, meaning that the average mentor had 1.24 protégés. Secondly, protégés did not uniformly stay in the game over time. *Tanks* is a particularly difficult game and drop-out rates of 70–90% are common within the first weeks of play. Only 20% were still active in December, meaning that there were 300 mentor-protégé pairs for some analyses and around 100 for others.

Thirdly, not all protégés began at the same time. The tests below standardize the mentor-protégé relationships to a day-zero starting time in order to conduct and report on meaningful data for survival analyses. Lastly, it is important to note that the survey data were only collected for the mentors, not the protégés. Game companies are generally unwilling to tamper with new players who are much less stable than veterans, and for whom the imposition of a survey might cause them to leave the game. Therefore, while we have behavioral measures for both mentors and protégés, we do not have the demographic and affective information for protégés and rely on in-game proxies where available.

Measures

Self-report measures came from the survey, while the behavioral measures came from the game's back-end data warehouse. Age (M = 42.6, SD = 17.2), income and education were taken from standard survey measures. Income was measured with a 7-point scale ranging from under $15,000/per year (1) to $250,000 or more (7) (M = 3.55, SD = 1.85). Similarly, education was measured with an 8-point scale ranging from "Less than high school" (1) to "Doctoral degree" (8) (M = 3.73, SD = 1.60). Relatedness was measured with the three-item subscale of the same name in the Basic Psychological Needs Scale (La Guardia *et al.*, 2000), modified to reflect the game context. The 5-point scales questions were "I feel cared about in this gaming community," "I feel a lot of closeness in this gaming community," "I feel a lot of distance in the gaming community" (reversed) (α = 0.74, M = 2.68, SD = 0.93).

The concepts were operationalized with in-game data as follows: Mentorship was a yes/no flag recorded in the data warehouse for those participating in Wargaming's Referral 2.0 system for mentors and protégés. Success was measured with the win rate of the protégés, i.e. a simple percentage of games won or lost (M = 48.45%, SD = 13.50%). Battles played (mentor value M = 17521.88, SD = 15128.01) and battles played together between the mentor and protégé (M = 169.41, SD = 272.49) were taken from the data warehouse. For some analyses (noted below), win rate and battle count were given as a lifetime value, and in others for a given month where hypotheses were focused on longitudinal trends. Retention was measured by whether the player played at least one battle in a given month. Intensity was measured by the number of battles played in a given month.

Analysis

To test RQ1 on who is a mentor, independent samples *t*-tests were performed for age, income, education, relatedness and skill, comparing mentors and non-mentors. To test H1 we operationalized positive outcomes as new players' win rate.

Data were cleaned and analyzed to recognize two factors noted above: game dropout rates are typically high, and the protégés here did not start at the same time. As the results below will illustrate in more detail, 96% of the sample became inactive over the observation period. This is typical of industry churn rates, where a typical one-day drop-off rate is 75–85% (Adjust, 2022), one-week is 94% and the one-year rate varies from 95 to 97% (Lovell, 2011). Conducting analysis on the entire 11-month period would substantially inflate linear estimates of between group differences. In order to perform a standardized analysis on the surviving players, the data for the analyses of effects on win rate and battles played were restricted to complete observations within the first three months of player activity. This reduced the sample size to n = 168 among protégés and n = 6,502 among non-protégés. The effect of time (in months) since players first became active was examined. To test the hypotheses related to protégés performance (win rate) and engagement (battle count), repeated measures mixed models, in which observations were nested within individuals, were used to examine the effects of time active in-game (months), protégé status (H1, H3) and

co-play (H4) [1]. All models were estimated using maximum likelihood estimation. Analysis on each dependent variable was initiated with an empty mean model. Fixed and random effects were added in a stepwise manner, with model fit and parsimony assessed at each step using likelihood ratio tests and information criteria (AIC and BIC). The significance of individual fixed effects was assessed by their Wald test p-values. Results from the best fitting model are reported.

Results

Independent samples t-tests compared mentors and non-mentors to test RQ1 (see Table 1). Mentors were significantly more likely to be younger, have less income and education and more skill. There was no difference for relatedness. This analysis was followed by logistic regression analysis predicting mentorship on the basis of the same factors. For the regression analysis, education was dichotomized to indicate a degree obtained post-high school. Income was dichotomized to indicate an income greater than $50,000. The results of the logistic regression were similar to those of t-tests. However, the effect of income was not significant as OR = 0.83 (95% CI[0.51, 1.36]). Mentorship was negatively associated with age OR = 0.96 (95% CI[0.95, 0.98]) and positively associated win rate OR = 1.15 (95% CI[1.08, 1.22]). Having a post-high school degree was negatively associated with being a mentor OR = 0.63 (95% CI [0.39, 1.03], but this effect was non-significant at the 0.05 level (p = 0.063).

Correlations for the major study variables are given in Table 2.

H1 stated that protégés will have more in-game success compared to non-protégés. Beginning with an empty mean, person-level random intercept model for win rate, an

	Mentors		Non-mentors			
	M	SD	M	SD	df	t
Age	31.87	14.22	43.5	17.23	2,915	9.87^{***}
Income	2.96	1.88	3.60	1.84	2,656	4.88^{***}
Education	3.44	1.65	3.75	1.59	2,794	2.76^{**}
Relatedness	2.74	1.04	2.68	0.92	1,167	−0.67
Win rate	50.15	0.03	48.60	0.03	2,914	-7.01^{***}

Note(s): $^{**}p < 0.01$, $^{***}p < 0.001$
Source(s): Author's own creation

Table 1. T-test for differences between mentor and non-mentor players

Variable	1	2	3	4	5	6
1. Protégé win rate	1					
2. Battle count	−0.07	1				
3. Co-play battles	−0.01	0.17^{**}	1			
4. Mentor win rate	0.2^{**}	0.02	-0.17^{**}	1		
5. Mentor age	0.04	0.1†	−0.06	−0.08	1	
6. Mentor income level	0.07	-0.17^{**}	−0.07	0.17^{**}	0.13^{*}	1
7. Mentor education	0.11†	0.03	−0.01	0.24^{**}	0.24^{**}	0.44^{**}

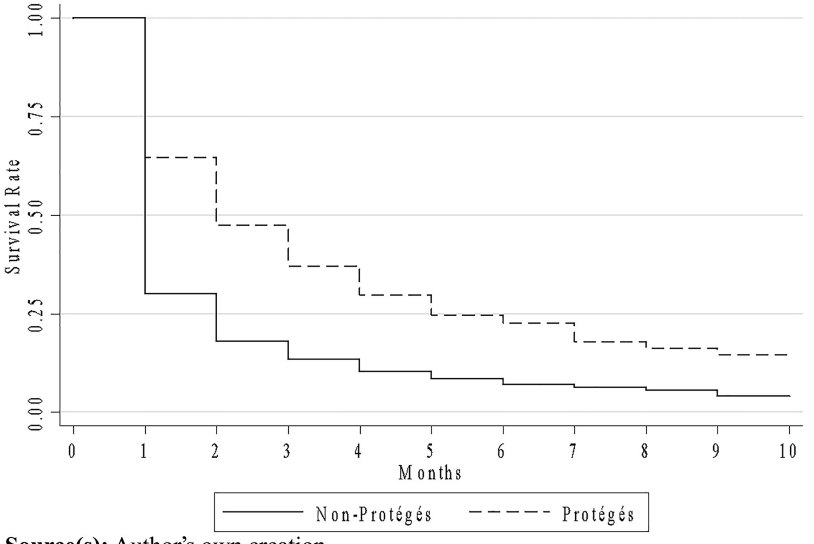
Note(s): Correlations based on data in repeated measures long format. Three complete cases included for each protégé, one for each month of play. Protégé win rate, battle count and co-play vary over time; mentor level data is time invariant
$^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$
Source(s): Author's own creation

Table 2. Pairwise correlations among win rate, battle count, co-play, and mentor characteristics

intraclass correlation = 0.12 was observed, indicating that 12% of the variance in the win rate was due to person mean differences (i.e. random intercept variation), and 88% was due to within-person variation over time. The best fit model for win rate included fixed effects for recruit status, time and their interaction, with random person-level intercepts.

The simple main effect of time was negative, indicating that for each additional month of play, specifically for comparison group members, the win rate was estimated to decline by 2% points (SE = 0.13, $z = -15.71$, $p < 0.001$). The difference between protégés and non-protégés during their first month of play was non-significant (SE = 91, $z = -1.15$, $p = 0.248$). However, by the second month, the protégé mean win rate was 2.3% points higher than non-protégés (SE=0.77, $z = 2.9$, $p = 0.003$). By the time players reached the three-month benchmark, protégés outperformed non-protégés by 4% points on average, with an estimated mean win rate for non-protégés of 45% compared to protégés' 49% (SE=1.1, $z = 3.74$, $p < 0.01$). Furthermore, the interaction term for time and recruit status indicated that protégés were predicted to increase their lead over non-protégés by 1.9% points per month. H1 was supported.

H2 stated that protégés would stay in the game longer than regular new players. To test this, survival analysis was conducted with the failure event specified as a player becoming inactive and remaining inactive through the end of the survey period. Ninety-six percent of the total sample became inactive at some point; however, a log-rank test for equality of survival functions showed that protégés were significantly less likely to become inactive (86%, $n = 448$) than non-protégés (96%, $n = 57{,}379$, Chi-square = 188.8, $p < 0.01$). A hazard ratio of 0.63 was estimated using a Cox proportional hazard model (SE=0.03, $z = -9.62$), demonstrating that protégés were significantly more active than non-protégés. While both groups experienced initially high rates of dropout in the early months of the survey period, these were proportionally smaller for protégés, 47% of whom remained active after the second month of play compared to only 17% of non-protégés. Figure 1 graphs the Kaplan–Meier survival estimates for each group. H2 was supported.



Source(s): Author's own creation

Figure 1.
Survival rates for protégés and non-protégés

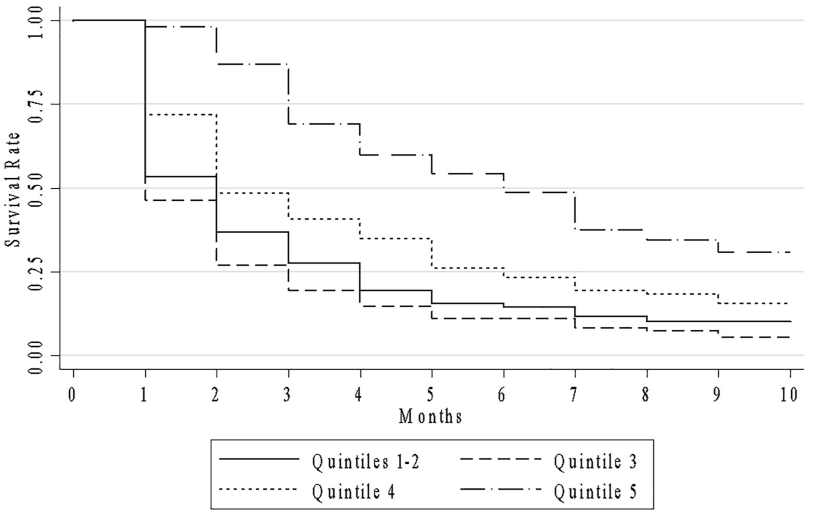
H3 predicted that protégés who stay in the game would be more active than regular players. Similar to the analysis in H1, a repeated-measures mixed model with observations clustered at the individual level was used to evaluate the effect of time and recruit status on the monthly count of matches. The difference between protégés and non-protégés in battle count was non-significant for the first two months of activity. The interaction term for recruit status and time was non-significant, but suggested that protégés would play in 15 more battles than non-protégés on average for each additional month of play. By the third month, the difference between the two groups had grown enough to show a significant effect, with protégés engaged in an average of 47.5 more battles that month than non-protégés (SE = 24.14, z =1.97, p =0.049). H3 was supported.

H4 predicted that co-play between mentors and protégés would generate more success for protégés. For this model, random intercepts for both mentors and protégés were included (i.e. protégé data was treated as nested within mentor). The data were again restricted to complete cases in the first three months of play (N = 168). As discussed in more detail below, the raw co-play variable was strongly right skewed. To normalize the distribution and improve interpretability, the log of co-play was used as the primary predictor of interest. Holding other factors constant, the estimated simple linear effect of time in the model was −4 percentage points per month (SE=2.1, z =−1.98, p = 0.047). Similar to previous models, the effects of co-play did not become statistically significant until the third month of play, likely driven by a marginally non-significant interaction between log co-play and time in months (β = 0.77, SE = 0.43, z =1.77, p =0.077). The coefficient for the effect of a log increase in co-play at the third month was positive and significant (β = 1.3, SE=0.61, z =2.13, p =0.033), indicating an approximately 0.013% point increase in the win rate for a 1% increase in co-play. H4 was supported.

H5 stated that co-play between mentors and protégés would increase the longevity of protégés. Cox regression with the number of co-played battles predicting the hazard of becoming inactive was run. The estimated marginal effect of a co-played battle with a protégée was a small but significant 0.003 decrease in the log-hazard of becoming inactive (SE = 0.0005, z = −6.15, p < 0.001). However, the distribution of the co-play variable was strongly right skewed (Mean = 74, Median=8, Skewness = 3.6), meaning that while many players experienced very little co-play with mentors (39% of players experienced 0 co-play matches), a smaller number (20%) experienced 305 or more. To improve interpretability, the number of mentor-protégé co-played battles was recoded into quintiles and the Cox regression was repeated with the first quintiles (co-play battles = 0) used as the referent (see Figure 2). Since the first two quintiles both had 0 co-plays, observations for these players were collapsed into a single category. This model showed good overall fit (LR-Chi-square=56.4, p < 0.01), with no effect from co-play in the third quintile (M = 8 co-played matches), a 0.29 reduction in the log-hazard of becoming inactive in the fourth quintile (M = 49, SE=0.13, z =−2.2 p =0.028), and a 0.85 reduction in the log-hazard of becoming inactive in the fifth quintile (M=306, SE=0.14, z =−6.1, p <0.001). H5 was supported.

H6 predicted that mentors with higher skill would produce protégés with higher skill, again assessed by win rate. The indicator of mentor success in this model was the time invariant overall win rate of the mentor (M=50%, SD=3.3). Due to the time invariant nature of these data, no linear effect of time was included in the fixed portion of the mixed effects model, though observations remained clustered under mentors and individuals. Models including fixed and random effects of time, co-play and random effects of mentor skill failed to improve model fit or substantially alter parameter estimates. The marginal effect of a 1% point increase in mentor's overall win rate was an increase of 0.8% points for recruits (SE = 0.2, z = 3.93, p < 0.001). H6 was supported.

Cox regression was again used to evaluate RQ2 and H7, with protégés' longevity as the dependent variable. RQ2 asked whether mentors with higher skill would have protégés with



Source(s): Author's own creation

Figure 2.
Survival rates by co-play quartile

greater longevity. This model showed poor fit (LR-Chi-square=0.02, $p = 0.89$), with no effect from mentor skill ($\beta = -0.19$, SE=1.4, $z = -0.14$, $p = 0.892$). Next, the hypothesis that more experienced mentors would have protégés with greater longevity (H7) was evaluated. Again, the model fit was poor (LR-Chi-square=3.36, $p = 0.19$) and the results were non-significant (Hazard Ratio = 0.99, $z = -0.22$, $p = 0.828$). H7 was rejected.

Discussion

A series of tests of an online team-based game explored the relationships between the traits of mentors and the subsequent outcomes for protégés. These tests leveraged an unusual data set with standard survey measures as well as behavioral measures to examine several theorized mentor-protégé outcomes in a novel context. These focused on three major questions derived from the literature: Who are mentors, what are the outcomes, and what mentors do the best job? The results were generally positive for mentor-protégé relations. In line with predictions grounded in SCT, the general conclusion of the findings is that simply having a mentor and spending time with them is of direct and powerful benefit to the protégé, especially on their own longevity. This is consistent with findings within the organizational communication literature, which has shown that time spent is a key predictor in workplace mentorship (Baugh and Fagenson-Eland, 2005; Chao *et al.*, 1992; Tonidandel *et al.*, 2007). It may not matter much who the mentor is so much that they care enough to put in the time, and the more time spent, the larger the positive outcome.

In looking at who opts in to being a mentor, the results did not show the expected connection to either age or education. Being older or more educated did not increase the likelihood of mentorship, the opposite was the case. Players of *Tanks* are relatively older compared to players of other games. The mean age of mentors in the study was 31.9. Being relatively younger thus does not imply that mentors were not adults. Still, it is possible that this finding is unique to this game, or to gaming in general.

With gaming being the world's dominant media pastime, the findings have merit independent of their generalizability. Nevertheless, it is worth exploring whether our existing

theories need to add extra nuance to account for the different motivations and processes that may exist between gaming and the workplace. It is possible that older and more educated people behave differently in game contexts than they do in workplace ones. It is also possible that they behave the same and that this difference is real. Future research could check this by replicating these measures in other games, or by engaging in more qualitative measures to hear from the players about their motivations to play in the first place. After all, most people need to work but most do not need to game, so perhaps the social role in someone's life does not "map" (Williams, 2010) neatly. However, there are many anecdotes of players who behave precisely within games as they do without them, as in the case of the construction worker who went online to perform mindless construction in his off hours (Dibbell, 2006).

Income was thought to predict mentorship in that wealthier people should have more disposable time and income to be with protégés. This was not the case, and poorer players were no more or less likely to become mentors. While somewhat surprising, this finding is in line with work showing that poorer subjects were systematically more generous than wealthy ones (Piff *et al.*, 2010). The authors attribute this to poorer people being more aware of the need for prosocial values as a survival mechanism and having a "greater commitment to egalitarian values and feelings of compassion" (Piff *et al.*, 2010, p. 771). Here, we find neither. This could be a common pattern across games, or only for this particular title.

Relatedness did not play out as expected, with no real difference between mentors and non-mentors. It was reasonable to expect that kind and thoughtful people are more likely to act in a kind and thoughtful manner. As noted above, this may be the result of the program driving more extrinsic motivations among a younger group. Given that the *Tanks* mentorship program offers direct compensation for the effort, this may have overridden kindness as a motivator. This result does not support Allen's (2003) motivational pluralism hypothesis, at least in this new and possibly different context.

Lastly in this set, mentor skill was strongly related to protégé skill. SCT predicts that interacting with a skilled mentor should lead to better outcomes than with an unskilled one, and success in win rates did occur, suggesting some form for skill transfer from mentor to protégé. This was in addition to the large effect from time spent with the mentor on longevity. In this case, the large difference between regular newbies and protégés may instead stem from the social and psychological support that being with a mentor may offer. Again, context is important: *Tanks* is difficult for new players, with a player base that is unforgiving and impatient with minor faults among teammates. The game pairs brand-new players with players who have been playing for 4–10 years. What mentors may be providing, then, is a social buffer against the large negative affect that newbies usually experience.

Success was the theme for the second set of tests, focused on whether protégés or regular newbies would fare better. In examining the first three months of play, protégés had substantially higher win rates, growing to a 4% gap of 49% among protégés vs. 45% among regular new players. These numbers were strongest among those who played more with their mentors, indicating that spending time together was more valuable than simply having a mentor. Additionally, these effects did not manifest until month three of the relationship, suggesting that there is some social dynamic in addition to the basic learning curve of a difficult game. This could be a "get to know you" period, or for players with existing relationships, some new phase of their interaction, possibly even including peer pressure. Regardless, these patterns are consistent with the basic tenets of SCT, which is based on observational modeling and increases over time and exposure.

The size of these outcomes is also notable; a 4% point difference may not seem like a large number, but within the context of this game, it is extraordinarily large. In *Tanks*, the majority of players cluster tightly around the mean value of the win rates. Ties are a possible outcome of each match, so the mean win rate is not 50% but 48.73% (per public API data at wotlabs.net). A matchmaking algorithm and large team sizes combine to make most matches

competitive, and so win rates have very small variance: 99% of players with a year or more of experience have win rates below 56%. The 45% win rate for regular new players puts them in the bottom 6% of the overall player base, while the 49% for protégés actually puts them *above* average, even among their much more highly experienced peers. Thus, this skills transfer is a contextually dramatic result, given that the literature on mentorship does not suggest that protégés will leapfrog others in the organization in a short span of time.

There were similarly dramatic results for longevity, with newbies dropping out at a rate of 96% vs. protégés at 88% over the eleven-month observation period. Protégés were also significantly more active than their regular newbie counterparts. As with the win rate analysis, context is critical in interpreting these rates. The industry average for retention is 94% after one week (Freer, 2019). Numbers for three months are vanishingly low, meaning that *Tanks'* regular player retention baselines are very healthy compared to the average game's. The impact of mentorship tripled that already-impressive baseline, moving retention from 4 to 12%. This is evidence that mentorship has large, positive effects on longevity in a game setting and is consistent with research in workplace settings that found positive patterns (Baugh and Fagenson-Eland, 2005; Chao *et al.*, 1992). Clearly, the "showing up" value of mentors' time is a significant variable in protégé success, and this basic conclusion might transcend setting.

The last set of tests sought to find whether the positive traits of a mentor would transfer to the protégé, namely their skill and longevity. Surprisingly, none of these bore out, suggesting that who the mentor is does not appear to matter in this context and for these traits. All that maintained significance was the time spent together for the longevity of the protégé. SCT suggested that at least the skill aspect would transfer, and likely the others as well. However, SCT is also flexible enough to account for different local contexts. While most research focuses on the relationship between an experienced older model and their younger counterpart, this context found that younger players mentored as well. Perhaps younger mentors do not transfer characteristics as well. If this is true, it would add an interesting nuance to SCT. Alternatively, the social buffering speculation may be a better theory frame for these tests when conducted in fraught environments like a contentious online game. In turn, this may offer some speculation into similarly fraught workplace settings. Perhaps the value of a mentor in a tough workplace environment is less about how skilled the mentor is and is instead about how well they can shelter the new worker's psyche until they develop enough self-driven resilience to manage on their own. For SCT, that is particularly intriguing as it is the underpinning for the effects thinking that dominated the first 30 or so years of game research. Given that games are increasingly social spaces; this suggests that researchers strongly consider social factors when applying theory frames to effects tests.

And again, is this lack of transfer a finding particular to this context or more generalizable to other settings, including the workplace? On the everyday side, it has a "good news, bad news" element to it. It is somewhat negative to see that a mentor does not transfer their advantages to their protégé as we would hope that successful people can generate success for others. On the other hand, given that mentorship at its worst is pure nepotism (of elders or among friends), there is a potentially egalitarian aspect to this non-finding. Nepotism is neither helpful nor necessary. In this context, all that mattered was the time spent together. The "haves" do not necessarily pass on their advantages, allowing for a more meritocratic process among the "have-nots." Ultimately, one of the strongest aspects of games mirrors sports; they are at heart true meritocracies. In a track race, your connectedness and your family's wealth will not help you run faster. And as Herz (1997) wrote of arcade games early on "It didn't matter what you drove to the arcade. If you sucked at Asteroids, you just sucked" (p. 47). Put less piquantly, skills and motivation on the part of the protégé are still necessary for success and having a mentor, super-charges these innate traits, or perhaps shelters the protégés until they can safely grow on their own.

Limitations, contributions and looking ahead

As we noted above, using a game is not a direct mapping to other settings, such as workplaces. Among other differences, players in a free-to-play game drop out at a vastly different rate than do new workers. The results here apply to one game, and may or may not apply to office mentoring. Does this apply to typical workplace settings, or to other spaces that are less work-like such as folding in new people to a community at a school, neighborhood, etc.? We cannot know from our data here, but it is plausible that experienced people in a wide range of settings have the potential to interact with newbies in positive ways. This may differ by context and should be operationalized carefully.

We know from the workplace literature that more typically studied mentorship contexts do not include prior relationships, or direct peers, though SCT allows for peer learning. Our data did not allow us to include prior relationships, and this may moderate the effects. This remains an open question for future work. And as with all research, the methods used here have its strengths and weaknesses. Although there is complete information for those in the study, not all players were surveyed, and a higher response rate than the 22.8% would generate higher confidence. As with nearly all surveys, we cannot know the impact of self-selection bias. Additionally, it was infeasible to collect survey-level data on protégés because this is a particularly sensitive population for a commercial company. We were unable to survey newly onboarded customers as they are at a sensitive point in their lifecycle, and losing one of them to the annoyance of even well-meaning researchers could cost the company substantial future revenue.

Lastly, it is worth noting the generalizability constraints of looking at one game and in one place. This particular title is not representative of all games. A case can be made that it is representative of competitive team-based titles, given that it has combat, player roles, timed matches, ranking systems and organized teams. However, there is additional variance even within this genre as some games will have different mechanics, norms around communication, or other differences. These should be accounted for by future researchers. As noted, this is a contentious space while others are more easygoing, although contentiousness is common in online gaming. This title is also a global one, yet the data here were only from North America. These results may not generalize to other locations. Future research can look at other games and other locations to expand or add nuance to the generalizability of these findings. Just as importantly, non-game settings would be of great value to inform whether these results are consistent in competitive, or even non-competitive work spaces. Lastly, we did not have direct measures of learning and socialization. Indeed, it is challenging to add large question batteries when working with a commercially driven research partner. If future researchers are able to add these, or to gain insights via ethnographic approaches, the links to the SCT process would be strengthened.

Despite these limitations, the current study makes clear contributions to the evolving literature on mentorship and has practical implications for both workplace and game leaders and perhaps elsewhere. By adding objective and unobtrusive measures to some of the fundamental questions, this study expands our collective understanding of who mentors are, what protégés get (or don't), and how little is transferred. A key contribution of this research is its ability to look at relationships over time, and to do with longitudinal behavioral data for which most prior work has had to rely on retrospective survey-based measures. According to Tonidandel *et al.* (2007) a shortcoming in much of the prior literature has been a reliance on cross-sectional data, or a lack of interest in duration. This may have been a product of the difficulty of obtaining complete longitudinal data in ordinary work settings. This study has been able to use direct behavioral measures over time, paired with objective and complete measures of both success (win rate) and longevity, without relying on self-report or sampling (with the exception of the subset of tests using survey data). Having seen that with this higher-resolution data, time is still likely the most critical variable of all, the ongoing

theoretical development of mentor-protégé ties should focus on longitudinal data and the intensity of the relationship, whenever possible. Additionally, the traits of mentors and protégés may matter more in other contexts than the one here, and so should continue to be measured when possible.

One particularly valuable direction for future research would be an investigation of how mentors in a context like this one actually work with their protégés. Beyond the time spent, what are the mentors actually doing? If they are shielding players from negative affect as we have speculated, how does that work? If they are teaching specific skills, which ones and how? Is this through instruction or mimicking, or some other practice? The educational games literature has frameworks for conceptualizing and testing these processes that go well past the methods employed here (e.g. Schrader *et al.*, 2019). We acknowledge that there are many researchers exploring relationships and meanings-making among players and teams rather than the causal effects we sought to measure (e.g. Nielsen and Hanghøj, 2019; Rambusch *et al.*, 2007; Reeves *et al.*, 2017). We suggest that the depth of such approaches, typically achieved via qualitative methods, would be particularly valuable for understanding the processes of mentorship, and that if paired with larger-scale data, could offer enviable depth and breadth.

For now, the standout finding is that for protégés, simple time spent matters more than the other advantages we might think a mentor will pass along. Secondly, the results show unsurprisingly that thoughtful people are thoughtful. For HR professionals in the workplace and for leaders inside game spaces, the implication is that the "old boys'" network may not be as vital to success as we might think. Finding kind people who will put in the time is what will benefit the new people entering the system, and by extension the larger organization. The findings here may also help bridge some of the gaps between research and practice cited by Ragins and Kram (2007). As Hezlett and Gibson (2007) noted, there have been few such pieces of research that HR professionals could rely on for building their mentorship programs. This work serves as a signal that successful mentoring programs may be those that encourage increasing the time mentors and protégés spend with each other, and that finding highly successful mentors may not be as critical. Practically speaking, there will be more possible mentors if the pool is widened from only the top performers, and so more new workers might benefit. Ultimately for them, although looking at individuals is valuable, the organization's goal is macro-level benefits like retention and productivity. To get these benefits, this work suggests finding thoughtful people who will put in the time rather than focusing on their other traits.

For the game industry, the implication is clear. With quitting rates in the 90s, customers exit games in droves, and publishers need ways to keep them. This research shows—at least in this challenging game—that having help and reducing the amount of losing may go a long way to keeping players around. For an industry focused on monetizing players in increasingly common free-to-play games, having them stick around is a necessary condition.

Note

1. Because all recruits are nested within mentors, but no non-recruits are nested within mentors, it was not possible to conduct an analysis comparing the two groups while accounting for the intra-cluster correlation on mentor. However, among protégés, there was significant variance by mentor on win rate, for example $F(126, 377 = 1.73, p < 0.001)$. To ensure that clustering did not have a substantive impact on the analysis, we assigned all non-protégés a mentor identification number equal to their personal identification number and then reran the analysis with observations clustered at both the individual and mentor level. This had no impact on the results.

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