Designing Gamification in the Right Way

Gamification is still relatively new as a topic of research. While the use of gamification is becoming more popular, there are few systematic studies that assess and measure the impact of gamification.[1] For this reason, many benefits of gamification are hypothesized rather than verified at this point. In chapter 2, we saw that gamification of learning is not identical to educational games since the latter are full-fledged games while the former is only a lightweight application that applies game elements to the learning context. But both the gamification of learning and educational games share the same process of gamifying learning elements to create the final product. Consequently, the studies that evaluated the efficacy of educational games are relevant to the discussion on the evaluation of gamification projects.

Previous studies about serious games failed to produce strong evidence for their pedagogical efficacy when compared to other instructional methods due to methodological shortcomings.[2] Furthermore, assessing the effectiveness of an educational game is not a straightforward task because there are many variables to be considered such as whether a game is of the type that is most suitable for the learning content in question, whether the learning content itself is suitable for a game in the first place, students' previous knowledge about the learning content, and what their individual preferences are for a type of game.[3]

A Clear Goal

The examples of gamification in the previous chapter showed that gamification is currently being utilized in education and libraries for the purpose of improving user engagement and instruction. But the goals of many gamification projects do not appear to have been clearly set out before the projects began. This is probably due to the fact that gamification is still seen as a relatively new and experimental strategy. Nevertheless, considering various outcomes from a gamification project in advance and determining which outcome should be given the highest priority can greatly facilitate the evaluation and improvement process of a gamification project. Suppose that an instructor gamifies part of or all homework for a class with a leaderboard, points, teams, challenges, missions, and badges. The goal of this gamification may simply be to increase the number of students who submit the homework on time. Or the goal can be set as better grades from the students in the low performance group, the longer retention time of the subject knowledge taught, or increasing students' collaboration skills through working out challenges and missions as a team. Setting a clear goal for a gamification project makes it much easier to design the project and to evaluate it after it is run.

If we are gamifying library services or programs, here are some examples of questions that we should ask in advance. Do we simply want to advertise various activities taking place in the library more widely? Or do we want to increase the attendance of a library program? Do we want to use gamification as a way for students to understand better why plagiarism is unacceptable? Or do we want patrons to be able to successfully order an interlibrary loan service on the library website? How about retaining the knowledge of different citation style formats? Note that these goals are not necessarily mutually exclusive but are not identical either.

Target Group and User Types

Once a clear goal is set for a gamification project, we need to also consider at whom the gamification is directed and what the characteristics of the target group are. For example, at an academic library, it would be good to think about whether a particular gamification project is to be designed for all students in general or a certain group of students such as freshmen, seniors, international students, business school students in their summer internship, or students with poor grades in writing classes, and so on.

After determining the target group for a gamification project, another important thing to consider is the user type. Bartle classified players in the MUD (Multi-User Dungeon) games into four types: *achievers*, *explorers*, *socialisers*, and *killers*. (MUD is an adventure game played through real-time interaction with other players in a virtual world described only in text.) He describes the four types as follows:

- "Achievers regard points-gathering and rising in levels as their main goal."
- "Explorers delight when the game reveals its internal machinations. . . . They try progressively esoteric actions in wild, out-of-the-way places, looking for interesting features . . . and figuring out how things work."
- "Socialisers are interested in people, and what they have to say. The game is merely a backdrop, a common ground where things happen to players. Inter-player relationships are important: empathising with people, sympathising, joking, entertaining, listening; even merely observing people play can be rewarding—seeing them grow as individuals, maturing over time."
- "Killers get their kicks from imposing themselves on [and causing distress to] others."[4]

It is easy to see that people in different user types may prefer one type of game to another. Bartle's player types have served as a general framework for other game researchers and a guideline for game designers even though they are specific to MUD-type games.[5] Marczewski modifies Bartle's player types to fit the context of gamification as follows.

- *player* (motivated by extrinsic rewards)
- *socialiser* (motivated by relatedness)
- *free spirit* (motivated by autonomy)
- *achiever* (motivated by mastery)
- *philanthropist* (motivated by purpose)[6]

The main difference between Bartle's player types and Marczewski's gamification user types is that the latter accommodates the fact that unlike games whose players always want to play, gamification will have two different types of people: those who are willing to play for extrinsic rewards and those who are not. The "player" type refers to those who are motivated to play by extrinsic rewards. By contrast, the "socialiser," "free spirit" (a type similar to Bartle's "explorer"), "achiever," and "philanthropist" are motivated to play by intrinsic factors such as social connections, self-expression and exploration, personal achievement and mastery, and a sense of purpose.

These user types are theoretical abstractions, and people in the real world are likely to display characteristics of more than one of these types to different degrees. Nevertheless, they provide a useful guide in understanding how different motivations are involved in gamification and how a gamified application can be designed to appeal to those with different motivations. For the "player" type, it is clear that offering external rewards, such as a prize or a gift certificate, will increase user participation and engagement. For the other types, on the other hand, gamification needs to provide different types of incentives that will appeal to them. For example, high achievers in schools with good grades would fall under the category of "achiever" and are likely to be drawn to gamification if the game mechanics and dynamics enhance the sense of personal mastery and achievement. However, gamification that focuses on personal mastery and achievement would have little appeal to other types of users such as "socialiser" and "philanthropist." The "socialiser" type will enjoy gamification that offers a lot of social interactions, while the "philanthropist" type would respond well to gamification for a greater cause. The "free spirit" type will be drawn to game mechanics such as the detailed customization of avatars, space, and journey-type quests where many discoveries can be made and a lot of detours are available.

If you are designing a gamified application, embedding game dynamics and mechanics that appeal to the target group and providing the type of rewards that are attractive to the motivation of the majority of them would significantly improve the appeal of the gamification. For example, medical students are known to be highly competitive but have little time to spare beyond their study. Gamification for such medical students will be successful if it is designed to have the element of competition and can be played during a short break. But the members of the target group may belong to multiple user types. For this reason, in designing gamification, different types of motivation that appeal to different user types need to be carefully considered and balanced out instead of overly emphasizing one of them over others. In the context of education, thinking about these different types of users and their motivation in relation to different learning styles can also be beneficial. Students' different learning styles should be taken into account as an important factor in the design process of gamification

particularly if the majority of the target group prefers a certain learning style to others.

Other Variables: Gender, Age, Culture, and Academic Performance

In designing gamification, one should also be aware of the fact that variables such as gender, age, and cultural orientations can play a role in variance in the reception of gamified application. Kron et al. discovered that female students were about 35 percent as likely as male students to enjoy the competitive aspects of the video games.[7] A different study by Wohn and Lee showed that younger players (under age 32) play Facebook games to pass the time and relieve boredom, while older players (age 32 and up) play Facebook games to help others and also to get support and help from others.[8] Another study by Lee and Wohn revealed that different cultural orientations, such as individualism and collectivism, affect people's expected outcomes of playing social network games such as social interaction, recognition, entertainment, and diversion and that those expected outcomes in turn affect different game usage patterns.[9]

In addition, findings from the studies on serious games need to be taken into account in designing gamification. Kanthan and Senger studied the results of the midterm exam for second-year medical students after the use of a serious game and found that the results indicated that the game improved academic performance outcomes of students at the lower end of the scale more than those at the higher end.[10] They regarded this finding as consistent with Van Eck's claim that serious games benefit students with less self-motivation and lower grades.[11] If this holds true for gamification, educational gamification may be more effective when it is specifically designed as a learning tool for underperforming students. Another interesting observation from students reported in the literature is that serious games may be most beneficial as a supplementary tool in education rather than as a replacement for traditional teaching.[12]

Learning Content

In the context of learning and education, it is inevitable to notice the potential of gamification as a pedagogical tool beyond mere engagement. In 2006, Richard Van Eck noted that the taxonomy of games is as complex as learning taxonomies.[13] He argued that not all games will be equally effective at all levels of learning and that it is critical that we understand how different types of games work and how game taxonomies align with learning taxonomies. For example, card games will be best for promoting the ability to

match concepts, manipulate numbers, and recognize patterns; Jeopardy-style games are likely to be best for promoting the learning of verbal information (facts, labels, and propositions) and concrete concepts; arcade-style games are likely to be best at promoting speed of response, automaticity, and visual processing; adventure games, which are narrative-driven open-ended learning environments, are likely to be best for promoting hypothesis testing and problem solving. This means that there is a great need for matching specific learning goals with types of games or gaming elements that are most suitable for those learning goals.

The following list from Kapp presents seven types of knowledge, along with gamification elements and examples for each type. It can be taken as an effort to respond to this kind of need.

- "Declarative Knowledge"
  - Gamification elements: "Stories/Narrative, Sorting, Matching, Replayability"
  - Examples: "Trivia, Hangman, Drag and Drop"
- "Conceptual Knowledge"
  - Gamification elements: "Matching and sorting, Experiencing the concept"
  - Examples: "Whack a Mole, You Bet!"
- "Rules-Based Knowledge"
  - Gamification elements: "Experience consequences"
  - Examples: "Board games, Simulated work tasks"
- "Procedural Knowledge"
  - Gamification elements: "Software challenges, Practice"
  - Examples: "Data Miner, Software scenarios"
- "Soft Skills"
  - Gamification elements: "Social Simulator"
  - Examples: "Leadership simulation"
- "Affective Knowledge"
  - Gamification elements: "Immersion, Providing success, Encouragement from celebrity-type figures"
  - Examples: "Darfur Is Dying"
- "Psychomotor Domain"
  - Gamification elements: "Demonstration, Haptic devices"
  - Examples: "Virtual Surgery Simulator"[14]

Darfur Is Dying
www.darfurisdying.com

Virtual Surgery Simulator
https://smiletrain.biodigitalhuman.com/home

Needless to say, Kapp's is not the only classification of knowledge. In addition, the items that he lists

as gamification elements are closer to a type of game or a gaming activity than the game mechanics or dynamics that we have discussed. But in the context of education, this classification is still useful in investigating further how to best apply gamification to learning and instruction. For example, with the MDA framework that we have seen in chapter 3 in mind, which game mechanics, dynamics, and aesthetics would be best mapped to each of Kapp's seven types of knowledge? This is a challenge for anyone who is interested in gamifying learning. Game aesthetics are less directly tied to the learning content and more closely related to what kind of emotions and experience the gamification tries to deliver. For this reason, any game aesthetics that can serve the purpose of delivering the given learning content can be chosen, whether it is narrative, challenge, discovery, achievement, or fantasy.

On the other hand, coming up with compelling game dynamics and supporting them with appropriate game mechanics is much more challenging. For example, acquiring demonstrative knowledge requires a lot of repetition and association. From this, we can infer that game dynamics and mechanics that facilitate the repetitive performance of tasks without making them boring would be best utilized for this type of knowledge acquisition. Points can be a useful game mechanics here, and feedback, progress bars, time pressure, and countdowns can all work well as appropriate game mechanics for this category of knowledge because they can invoke game dynamics such as a sense of urgency in players and turning the repetition of the same type of task into something exciting. Those who design gamification, however, must go one step further and should ultimately create a playful and fun experience from those game mechanics and dynamics. This is where each designer's creativity and imagination come to play a unique role in creating successful gamification.

What is to be avoided is to blindly set a certain game mechanics, dynamics, or aesthetics as an ideal and to neglect the right fit with the given learning content. The study by Adams et al. illustrates what happens when such a fit is ignored.[15] They measured students' learning outcomes for the same learning content through three different learning methods: a narrative game, a non-narrative game, and a PowerPoint slideshow. The learning content tested in this study was (a) how pathogens work and (b) how various electromechanical devices work. For the content about how pathogens work, students were divided into a game group and a non-game group. Students in the game group played a game called "Crystal Island," in which they were given the challenge of discovering the source of an unknown disease on a remote island through interacting with other characters and using lab microscopes to run tests. By contrast, those in the non-game group learned the same content by viewing

a matched slideshow that contained the same text and images used in the game to explain pathogens. For the content about how electromechanical devices work, students were divided into a narrative game group, a non-narrative game group, and a non-game group. Students in the narrative game group played a game called "Cache 17," in which they were tasked to find a long-lost painting in an old bunker system dating back to World War II. To make their way through the bunker system to find the painting, students had to construct electromechanical devices to help open doors. In addition, they were given a narrative about the character and had to interact with other game characters during the game. On the other hand, students in the non-narrative game group played the same game, but neither a narrative nor other characters were given, and the documents they read contained information only about the electrical devices they had to use. Lastly, those in the non-game group learned the same content by viewing a matched slideshow that contained the same text and images used in the game's resources to explain the devices.

The results of these two experiments showed that students learned both sets of content significantly better by viewing a slideshow presentation than by playing a hands-on narrative adventure game.[16] However, this does not mean that discovery and narrative are not useful game elements for the gamification of learning. It simply means that discovery and narrative were not the most appropriate game dynamics for teaching those two particular sets of learning content. Adams et al. also took their study results as supporting the distraction hypothesis, which holds that certain aspects of game playing—discovery and narrative in this case—can distract the learner from the academic content of the lesson rather than facilitating the learning process.[17]

Can Gamification Be Harmful? Tangible Rewards and Intrinsic Motivation

While gamification is touted as a new way to engage and motivate people and even to influence their behavior, there are also critiques of gamification that need to be heeded. For example, some critiques argue that gamification can become "exploitationware" with counterfeit rather than genuine incentives.[18] Rughinis noted that gamification of education can also become exploitative "if it becomes an excuse for a simplistic, inadequate design of learning."[19]

One of the most interesting critiques of gamification revolves around the concepts of external reward and intrinsic motivation. Motivation falls under two categories: extrinsic and intrinsic. When we take an action out of extrinsic motivation, the goal of that

action is not the action itself but something else. On the other hand, when the goal of an action is the action itself, it is intrinsic motivation out of which we take that action. Deci, Koestner, and Ryan conducted a meta-analysis of 128 studies on the effects of extrinsic rewards on intrinsic motivation.[20] Their meta-analysis showed that "engagement-contingent, completion-contingent, and performance-contingent rewards significantly undermined free-choice intrinsic motivation . . . , as did all rewards, all tangible rewards, and all expected rewards. Engagement-contingent and completion-contingent rewards also significantly undermined self-reported interest . . . , as did all tangible rewards and all expected rewards. Positive feedback [i.e., verbal rewards] enhanced both free-choice behavior . . . and self-reported interest. Tangible rewards tended to be more detrimental for children than college students," and verbal rewards tended to be less enhancing for children than college students.[21] That is, external rewards undermine intrinsic motivation.

Since the goal of gamification is always something other than gameplay itself, it seems natural to assume that what motivates people to engage in any gamified application is almost always extrinsic. We turn to EpicWin and Chore Wars because we want to get things done, which we would otherwise procrastinate on doing. We play Nike + because we want to exercise regularly. We follow along the Codecademy program because we want to learn how to code. This puts gamification in a sharp contrast with a game, which people play for its own sake. Take the Speed Camera Lottery that we saw in chapter 2 as an example. People may not be willing to drive at the given speed limit. With the reward of potentially winning a lottery, however, the gamification generates extrinsic motivation for people to observe the speed limit. Now, what would happen if the camera were removed? It is easy to see that many drivers who were observing the speed limit only for a chance to win the lottery would start driving over the speed limit again.

But not all cases are this straightforward. Let's take the Bottle Bank Arcade machine as another example. The goal that the designers of the Bottle Bank Arcade machine had in mind was to encourage people to collect and recycle more bottles. But that does not prevent anyone from playing the Bottle Bank Arcade game for its own sake. The child who is jumping up and down with joy while playing this game is probably just as intrinsically motivated as someone who watches her favorite movie for the third time. In such cases, the reward that gamification provides becomes nontangible, and the motivation influenced by gamification is no longer extrinsic. The same person may be extrinsically motivated to collect and recycle more bottles, so that she can play the Bottle Bank Arcade game, and at the same time also intrinsically motivated to

do so because she wants to protect the environment. Humans are capable of enjoying the gamified experience for its own sake regardless of the designer's intention. It is also possible that intrinsic and extrinsic motivation coexist independently for the same activity.

Unlike in recycling or driving, however, educators care a great deal about whether a student is intrinsically or extrinsically motivated to participate in a learning activity. They do not want the students to play Fantasy Geopolitics only because they want to score more points and win the competition. Educators want them to realize that news reading is not as intimidating and difficult as it may seem and to eventually understand and even enjoy reading about current geopolitical issues. What if Fantasy Geopolitics or any other educational gamification undermines such intrinsic motivation for learning? Would rewards students' as points, statuses, or tangible prizes reduce or destroy students' intrinsic motivation to learn? Is gamification harmful rather than helpful to learning?

One way to solve the problem of the potential long-term negative effect of gamification on intrinsic motivation is to design gamification that does not depend on external rewards. For example, gamification can be designed to give more autonomy to users by allowing them to set their own goals or to guide them to make their own choices about the constraints to be placed for a given learning goal in educational contexts.[22] This can help users realize the relevance of the goal of gamification to them and understand how learning outcomes are connected to game elements in educational contexts. This can also in turn minimize the potential controlling aspect of rewards and instead strengthen their competence-affirming aspect. The challenge in this case is how to make tasks sufficiently fun to engage people without relying on tangible rewards and extrinsic motivation.

However, not all tangible rewards need to be removed from gamification or even from the gamification of learning. Gamification used for one-time activity, such as a library orientation or a promotional campaign, is not subject to its long-term negative effect on intrinsic motivation. Gamifying an activity that participants find dull or boring is also safe from such concerns because there is little intrinsic motivation to begin with to be undermined by rewards.[23] Also, gamification that offers an unexpected non–task-contingent reward can be utilized without the undermining effect on intrinsic motivation.[24] Furthermore, verbal rewards, also known as positive feedback, can be incorporated into gamification to enhance intrinsic motivation for adults as long as it is not given in a controlling manner.[25]

In designing gamification, we need to remember that gamification itself does not automatically generate motivation or engagement. For any gamification to succeed, it needs people's buy-in because they should

care enough to play along. It is for this reason that the more closely the goal of gamification aligns with the goal of a player, the more successful the gamification will be. This strategy also minimizes the potential negative effect of gamification on intrinsic motivation because in such a case players already are intrinsically motivated to a degree to perform the activity. They may need just a little extra push to actually do the work. As the designers of gamification, we also need to ensure that the rewards attached to gamification are appropriate to the context and do not pose the risk of distorting the intended context.

When people feel that gamification attempts to manipulate their behavior, they will inevitably object to and disengage from it. Even verbal rewards that were shown to enhance intrinsic motivation had an undermining effect when they were given with a controlling interpersonal style.[26] While this may be disappointing news to those who want gamification to be a panacea for motivation, people's autonomy should be respected in any attempt to engage them and influence their behavior. The fact that the reach of gamification has limits should not detract from its value. We need to instead apply gamification wisely, thoughtfully, and selectively with a clear goal; a thorough understanding of the target audience, the nature of the target activity, and the gamified learning content; and appropriate and effective rewards for the intended context. How to measure the success of gamification should be also planned ahead in relation to the goal of gamification.

Notes

1. Florin Oprescu, Christian Jones, and Mary Katsikitis, "I PLAY AT WORK—Ten Principles for Transforming Work Processes through Gamification," article 14, *Frontiers in Psychology* 5 (January 2014): 4, doi:10.3389/fpsyg.2014.00014.
2. Elie A. Akl, Kay M. Sackett, Richard Pretorius, Paranthaman Seth S. Bhoopathi, Reem Mustafa, Holger Schünemann, and William S. Erdley, "Educational Games for Health Professionals," Cochrane Database of Systematic Reviews, CD006411, published online January 23, 2008, doi:10.1002/14651858.CD006411.pub2; Ziad Alfarah, Holger J. Schünemann, and Elie A. Akl, "Educational Games in Geriatric Medicine Education: A Systematic Review," *BMC Geriatrics* 10:19 (2010), doi:10.1186/1471-2318-10-19; P. S. Bhoopathi, R. Sheoran, and C. E. Adams, "Educational Games for Mental Health Professionals: A Cochrane Review," *International Journal of Psychiatric Nursing Research* 12, no. 3 (2007): 1497–1502; Gillian Blakely, Heather Skirton, Simon Cooper, Peter Allum, and Pam Nelmes, "Educational Gaming in the Health Sciences: Systematic Review," *Journal of Advanced Nursing* 65, no. 2 (February 2009): 259–69, doi:10.1111/j.1365-2648.2008.04843.x.
3. Bohyun Kim, "Learning with Games in Medicine and Healthcare and the Potential Role of Libraries," in *Games in Libraries: Essays on Using Play to Connect and Instruct*, ed. Breanne A. Kirsch (Jefferson, NC: McFarland, 2014), 160–161.
4. Richard Bartle, "Hearts, Clubs, Diamonds, Spades: Players Who Suit MUDs," self-published online 1996, http://mud.co.uk/richard/hcds.htm.
5. Donghee Yvette Wohn and Yu-Hao Lee, "Players of Facebook Games and How They Play," *Entertainment Computing* 4, no. 3 (2013): 172, doi:10.1016/j.entcom.2013.05.002.
6. Andrzej Marczewski, *Gamification: A Simple Introduction and a Bit More*, 2nd ed. (self-published on Amazon Digital Services, 2013), Kindle edition, Loc 1405 of 1798.
7. Frederick W. Kron, Craig L. Gjerde, Ananda Sen, and Michael D. Fetters, "Medical Student Attitudes toward Video Games and Related New Media Technologies in Medical Education," *BMC Medical Education* 10:50 (2010): 7, doi:10.1186/1472-6920-10-50.
8. Wohn and Lee, "Players of Facebook Games," 175.
9. Yu-Hao Lee and Donghee Yvette Wohn, "Are There Cultural Differences in How We Play? Examining Cultural Effects on Playing Social Network Games," *Computers in Human Behavior* 28, no. 4 (July 2012): 1307–14, doi:10.1016/j.chb.2012.02.014.
10. Rani Kanthan and Jenna-Lynn Senger, "The Impact of Specially Designed Digital Games-Based Learning in Undergraduate Pathology and Medical Education," *Archives of Pathology and Laboratory Medicine* 135, no. 1 (January 2011): 141, www.ncbi.nlm.nih.gov/pubmed/21204720.
11. Richard Van Eck, "Digital Game-Based Learning: It's Not Just the Digital Natives Who Are Restless," *Educause Review* 41, no. 2 (2006): 16–30.
12. Bill Kapralos, Sayra Cristancho, Mark Porte, David Backstein, Alex Monclou, and Adam Dubrowski, "Serious Games in the Classroom: Gauging Student Perceptions," in *Medicine Meets Virtual Reality 18* (e-book), ed. James D. Westwood, Susan W. Westwood, Li Felländer-Tsai, Randy S. Haluck, Helene M. Hoffman, Richard A. Robb, Steven Senger, and Kirby G. Vosburgh, *Studies in Health Technology and Informatics*, vol. 163, (Amsterdam, The Netherlands: IOS Press, 2011), 259.
13. Van Eck, "Digital Game-Based Learning," 22.
14. Karl M. Kapp, *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education*, (San Francisco: Pfeiffer, 2012), table 8.1, 189–90.
15. Deanne M. Adams, Richard E. Mayer, Andrew MacNamara, Alan Koenig, and Richard Wainess, "Narrative Games for Learning: Testing the Discovery and Narrative Hypotheses," *Journal of Educational Psychology* 104, no. 1 (February 2012): 235–49, doi:10.1037/a0025595.
16. Ibid., 241.
17. Ibid., 246.
18. Ian Bogost, "Persuasive Games: Exploitationware," Gamasutra, May 3, 2011, www.gamasutra.com/view/feature/134735/persuasive_games_exploitationware.php.
19. Razvan Rughinis, "Gamification for Productive Interaction: Reading and Working with the Gamification Debate in Education," in *2013 8th Iberian Conference*

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on Information Systems and Technologies (CISTI), IN-SPEC Accession Number 13848780 (IEEE Xplore Digital Library, 2013), 2.

20. Edward L. Deci, Richard Koestner, and Richard M. Ryan, "A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation," *Psychological Bulletin* 125, no. 6 (November 1999): 627–68, doi:10.1037/0033-2909.125.6.627.

21. Ibid., 627.

22. Scott Nicholson, "A User-Centered Theoretical Framework for Meaningful Gamification," paper presented at Games + Learning + Society 8.0 conference, Madison, WI, June 13–15, 2012, http://scottnicholson .com/pubs/meaningfulframework.pdf.

23. Edward L. Deci, Richard Koestner, and Richard M. Ryan, "Extrinsic Rewards and Intrinsic Motivation in Education: Reconsidered Once Again," *Review of Educational Research* 71, no. 1 (Spring 2001): 14, doi:10.3102/00346543071001001.

24. Deci, Koestner, and Ryan, "A Meta-Analytic Review," 646.

25. Deci, Koestner, and Ryan, "Extrinsic Rewards and Intrinsic Motivation," 9.

26. Ibid., 13–14.