# Chapter 4
# Frustration Vaccination?
## Inoculation Theory and Digital Learning

**Josh Compton**
*Dartmouth College, USA*

## ABSTRACT

*Inoculation theory is a classic theory of social influence, describing how exposure to weakened versions of challenges motivates a process of resistance to protect against future, stronger challenges. Inoculation theory can offer useful guidance to teachers as they talk with Net Generational students about digital learning projects. Discussions guided by inoculation theory raise and refute potential challenges students may have in the process of completing their digital learning projects, helping to protect students against discouraging frustration, but also, encouraging a more thoughtful, nuanced consideration of the use of technology in meeting learning objectives. Inoculation theory-guided discussions will not only impact what students are thinking about, but even how they are thinking—bolstering digital learning project objectives.*

## INTRODUCTION

Digital learning can be a healthy part of Net Generational students' education regimens; projects that incorporate collaborative engagements with peers and with technology reflect a dynamic approach to knowledge (see Barnes, Marateo, & Ferris, 2007, for a review). Students can learn from creating original public service videos to educate and advocate, from recording pod-casts that share their literary analyses with a wider audience, from creating online how-to-guides for scientific experiments, and from consulting and analyzing digital resources to prepare speeches that help address pressing global problems. Technology and learning objectives can combine in ways that are dynamic and effective, with digital learning as part of a robust, nourishing curriculum.

DOI: 10.4018/978-1-61350-347-8.ch004

We should also consider, however, the other side of the medical analogy: While digital learning can be part of a healthy education regimen, digital learning also risks unique complications and side effects. For one thing, incorporating technology into classroom projects introduces potential problems with technology, from faulty equipment to confusing instructions, and these problems can distract from key learning goals and erode students' (and teachers') enthusiasm. Frustrations with technology become frustrations with projects, and frustrations with projects become frustrations with failing to meet learning objectives.

The analogy to medical treatment can be extended further: Digital learning can have adverse side effects, as digital learning processes can reinforce potentially unhealthy learning practices. Without thoughtful preparation and consideration, technology can move students toward "the habits of instant gratification and shallow thinking" (Barnes, Marateo, & Ferris, 2007, para. 20). Efficiency of information retrieval from technology can overshadow other learning processes that are more deliberate and careful. In pursuit of pragmatic benefits, pedagogical objectives can be slighted.

Fortunately, the medical analogy allows us to consider a remedy: inoculation. The premise of this chapter is that inoculation theory—a theory of resistance to influence (see McGuire, 1964; Compton & Pfau, 2005)—may provide an antidote to help teachers address complications and negative side effects of digital learning projects. Inoculation theory offers guidance as we consider best teaching practices using digital learning projects with Net Generational students.

Inoculation theory may offer benefits both practical and heuristic. When guiding discussions with students about digital learning projects, inoculation theory impacts *what* students are thinking about during digital learning projects and also *how* they are thinking about projects. Inoculation may help reflect something Barnes, Marateo, and Ferris (2007) observed of computer and digital technology: ways "to teach Net Geners not just what to learn but how to learn" (para. 20). Indeed, we may find that inoculation theory secures some of the pragmatic benefits of digital learning (e.g., efficiency) while simultaneously protecting pedagogical aims (e.g., thinking more critically). Inoculation helps prepare students to meet expected challenges during digital learning projects and, in the process, models a more robust, more deliberate way of thinking.

The case for inoculation theory-based discussions about digital learning classroom projects with Net Generational students is built on three ideas explored in this chapter: (1) Even if teachers and students have favorable attitudes toward and beliefs about digital learning projects (see Liaw, Huang, & Chen, 2007), such positions can be eroded by technology problems and other frustrations; (2) Some complications can be preempted, or at least lessened, by using fundamental components of inoculation theory to raise and refute challenges before they occur; and (3) Inoculating against specific complications, like frustration with technology problems, also fosters more nuanced ways of thinking.

Before considering a potential antidote to digital learning project side effects, it is important to note how inoculation theory fits within a conversation about Net Generational learning styles. Perhaps most importantly, inoculation-based communication does not merely tell an audience something. Inoculation models a deliberate, thorough analytical process, and its success is based more on active, dynamic thinking than on passive recall of information. By promoting active thinking, inoculation reflects Net Generational learning on a conceptual level. As Oblinger and Oblinger (2005) succinctly put it: "Students do best when they actively construct their own knowledge" (p. 2.13).

Inoculation also provides applied, practical benefits that are consistent with Net Generational learning styles. For example, Net Generational learners expect immediacy, but immediacy is

not always feasible (Oblinger & Oblinger, 2005). Nevertheless, teachers should be aware of this expectation, and inoculation provides a method for addressing it. For example, in light of the expediency offered by email, Net Generational students often expect quick response times from teachers when answering their emailed inquiries (Oblinger & Oblinger, 2005). Faculty may want to clearly communicate anticipations of their response times, and inoculation provides a framework for this type of communication—a way to preempt avoidable, unhelpful frustrations with digital learning by raising and responding to challenges before they occur. Inoculation is an exciting perspective from which to consider Net Generational learning—both on conceptual and applied levels.

## BACKGROUND

William McGuire's approach with inoculation theory in the early 1960s was, in many ways, novel. Instead of exploring ways of making messages more persuasive, he turned his research toward making people more resistant to persuasion and influence (see Compton & Pfau, 2005; McGuire, 1964).

The distinction seems simple—between exploring ways of enhancing persuasion and ways of instilling resistance to persuasion—yet the distinction has significant implications. With inoculation theory, the goal is not to persuade people to change their minds about something, but instead, to protect their existing positions against future challenges to the position. The comparison to medical treatments is illustrative. Doctors can treat conditions after patients are sick, but they can also prepare patients for future threats that have yet to occur (see McGuire, 1964). But how can a model of communication take an existing position (attitude, value, belief, opinion) and strengthen it so that it remains robust in the face of future challenges and attacks?

Inoculation theory's namesake does a nice job of explaining how the process of attitudinal inoculation works (McGuire, 1964). A conventional medical inoculation occurs through exposure to a weakened version of an offending agent, such as a virus. The virus is weakened enough so that the person does not get sick but strong enough so that it motivates a process of protection, such as the production of antibodies. Upon encountering a stronger offending agent, such as a stronger (or non-weakened) virus, those inoculated are less likely to get sick when compared to those who were not exposed to the weakened virus. Perhaps one of the most familiar examples of such an inoculation is an annual flu shot. Weakened versions of the influenza virus prompt a strengthening process in healthy patients, whereby exposure to weaker flu ultimately results in resistance to stronger flu. Medical inoculation is a type of training for disease resistance—a way to start small to build the process of resistance against stronger future attacks. We can consider similar processes from other contexts, such as singers warming up with scales before tackling more demanding performances, or an athlete stretching muscles before putting their bodies through more arduous tasks. Jumping into the more challenging tasks—unprepared without preparation—often leads to failure. But beginning with smaller challenges prepares for stronger challenges that could otherwise overwhelm.

Similar processes are at work with attitudinal inoculation. Attitudinal inoculation occurs through exposure to weakened versions of challenges—attempts at persuasion, or challenges to an existing way of thinking about something. The weakened challenges presented during attitudinal inoculation are diluted enough so that they do not convince the person to change position, but the weakened challenges are strong enough to motivate a process of resistance, or a bolstering of that position. Then, upon encountering future stronger challenges, those inoculated are more likely to hold their positions and resist influence (see McGuire, 1964; Compton & Pfau, 2005). In

short, inoculation protects by preempting future challenges. The medical analogy offers a clear explanation for how attitudinal inoculation can confer resistance to future challenges. But what would a message guided by inoculation theory look like?

The standard inoculation message is a two-sided message. That is, counterarguments (or, challenges to an existing position) are raised in a message, but refutations of the counterarguments are also provided. The refutations weaken the counterarguments (see Lumsdaine & Janis, 1953). In other words, challenges are presented, and weakened, in an inoculation message. In a standard inoculation message used in resistance research, two or three counterarguments are raised, followed by refutations of those counterarguments, for a simple pattern of counterargument-refutation, counterargument-refutation.

But this component—preemptive refutations of counterarguments—is only part of the process of how inoculation-based messages strengthen positions. Threat is the other part. Inoculation researchers have conceptualized threat as the recognition of a position's vulnerability (see, for example, Pfau et al., 2009). People experience threat when they realize that a position that they hold (e.g., attitude, belief, opinion) may not be as secure as they had originally thought. This recognition—this acknowledgement of vulnerability—triggers a strengthening process, presumably the consideration of additional counterarguments and refutations of those counterarguments. Without this acknowledgement of a position's vulnerability—of the risk of possibly changing one's stance—there is little motivation to engage in more active consideration of the issue (Compton & Pfau, 2005).

It is important to clarify that threat in inoculation is a specific kind of threat, a conceptualization of threat that may not match more common ways of thinking about it. Threat in inoculation is not a warning of punishment; threat in inoculation is not intimidation, nor is it a matter of scaring people into doing something differently (see Pfau, 1995). Instead, threat in inoculation is an acknowledgement that a currently held position could change under the pressure of future challenges. That is, the standard for threat in inoculation is not that people believe they *will* change their minds or *must* change their minds; the standard for threat is the belief they *might* change their minds. In inoculation, threat is vulnerability, and this vulnerability motivates more deliberation about the position. A person experiencing threat in the inoculation process might think something like: "Maybe I haven't fully considered my position on this issue. I'd better give this some more thought and attention."

These two processes—threat and counterarguing—ultimately lead to resistance during the process of attitudinal inoculation: Inoculation messages lead people to acknowledge the vulnerability of a current position (or attitude, or belief), which is called *threat*, and then they think through counterarguments and refutations of counterarguments, which is called *counterarguing*. These two processes work together, with threat providing the motivation for robust preemptive refutation through counterarguing (see Compton & Pfau, 2005; McGuire, 1964).

One of the features of inoculation that makes it a particularly attractive framework for communication strategies is that raising and refuting *some* counterarguments confers protection against *multiple* counterarguments (see Pfau & Kenski, 1990). That is, an inoculation message does not need to raise and refute *every* potential counterargument, or *every* potential challenge, to a position in order to confer resistance to future influence. Instead, the process of resistance unleashed by raising and refuting a few counterarguments protects against a range of challenges—including challenges not even mentioned in the inoculation message (McGuire, 1964). Here we find a power of attitudinal inoculation that we do not always find with medical inoculations. A flu inoculation, for example, protects against a specific type of

flu virus. Flu shots change each year to target the strongest variants of the flu. But an attitudinal inoculation—by raising and refuting a few challenges to a position—protects against a wide range of challenges to a position. This attribute of inoculation is particularly important in the context of ever-changing technology—and ever-changing technology challenges.

While the format of an inoculation message is clear-cut—raising and refuting challenges, usually in a two-sided message format—the resulting thinking triggered by inoculation messages is more complex. By presenting multiple considerations, inoculation messages offer richer, more nuanced treatments of issues—which consequently lead to richer, more nuanced thinking about issues. It is not just that inoculation messages are memorable; inoculation messages also change how people think about issues.

This attribute—inoculation-based messages leading to more thinking about an issue—provides one of the strongest arguments for inoculation's potential in improving digital learning projects with Net Generational students. Scholars have warned of the risks of "the habits of instant gratification and shallow thinking" (Barnes, Marateo, & Ferris, 2007, para. 20). For example, students may overestimate the relevance of the first articles retrieved through a Google search and apply superficial standards for assessing a source's credibility (Combes, 2008). Likewise, in her review of Internet literacy, Coiro (2003) warns of "shallow, random, and often passive interactions with text" (p. 458) that can characterize students' Internet use. Inoculation may address such potential problems by generating more thinking about an issue (e.g., Pfau et al., 2004) and thinking that endures (e.g., Pfau et al., 2004).

To encourage students to engage in richer, more nuanced thinking about digital learning projects, we may find inoculation theory to be a valuable tool. It can guide how we engage our students in digital learning activities, and this is the argument that we consider next.

## THE CASE FOR APPLYING INOCULATION THEORY TO DIGITAL LEARNING

For much of inoculation theory's development, resistance has been conferred to explicit, distinct attack messages, such as political attack advertisements (e.g., Pfau & Burgoon, 1988) and peer pressure to smoke cigarettes (e.g., Pfau & Van Bockern, 1994). In most cases, inoculation's application has reflected a "fight fire with fire" approach—to protect against an explicit persuasive challenge, offer an explicit preemption of that challenge through inoculation.

Inoculation's efficacy against explicit attack messages has an impressive track record in persuasion literature, with successful applications in health, politics, and commerce (see Banas & Rains, 2010; Compton & Pfau, 2005). However, to my knowledge, researchers have not yet explored inoculation's efficacy as an applied classroom teaching strategy—although it has been assessed with educational issues (e.g., plagiarism, Compton & Pfau, 2008) and with students as study participants (e.g., elementary, Pfau & Van Bockern, 1994; e.g., college, Pfau et al., 2009).

Although inoculation in an educational setting has not been thoroughly studied, its success is theoretically consistent. Indeed, Compton and Pfau (2005) proposed extending inoculation to other forms of influence. The theoretical case for extending inoculation to less conventional attack messages is strong: Inoculation should be able to confer resistance to *any* challenge to an attitude or belief, not just conventional, explicit persuasive messages (see Compton & Pfau, 2005; McGuire, 1964). A few contemporary inoculation researchers have tested this idea, moving from inoculating against specific persuasive messages toward types of influence that occur in more subtle, less identifiable ways. For example, Haigh and Pfau (2006) wondered if inoculation treatments could help boost employee morale in the workplace. Their findings suggested that raising and then

refuting potential challenges to employee commitment—prior to employees experiencing such challenges—could lead employees to demonstrate more positive attitudes toward their employer and have better morale. Applying inoculation to less tangible influences expands its utility—from explicit forms of persuasive attack to more abstract challenges to existing attitudes, beliefs, and opinions.

New insight into inoculation—new applications (e.g., Haigh & Pfau, 2006) and new theorizing (e.g., Compton & Pfau, 2005)—suggests that inoculation may help Net Generational students and their teachers as they engage in digital learning projects. Simply adding technology to class projects and instruction without careful analysis does not protect against less effective ways of thinking, such as "the habits of instant gratification and shallow thinking" (Barnes, Marateo, & Ferris, 2007, para. 20). But inoculation theory can offer such protection: It can preempt specific technology problems and unleash thinking that is more robust, more complex.

For an inoculation-based message to inoculate, the "right" attitude must first be in place (see Compton & Pfau, 2005; McGuire, 1964). That is, inoculation takes an existing position and makes it stronger, protecting it against future challenges. But one study found that even if the "right" attitude is not in place inoculation can still be an effective persuasive strategy, moving positions toward the points advocated in the inoculation-based message (Wood, 2007).

In the context of the Net Generation's experiences with digital learning, the pertinent attitude would be students' attitudes toward digital learning technology, or the use of digital learning technology for a specific course project. Some data suggests that students have confidence in their technology knowledge (e.g., McEuen, 2001); students also have favorable attitudes toward technology (e.g., Havelka, 2003), as do their instructors (e.g., Liaw, Huang, & Chen, 2007).

Protecting students' favorable positions on potential benefits of digital learning technology is important. When frustration leads to resistance, technology use can suffer (see Smart & Desouza, 2007, for a treatment of technology resistance in a business context), and "no matter how advanced or capable the technology is, its effective implementation depends upon users having a positive attitude toward it" (Liaw, Huang, & Chen, 2007, p. 1069).

I pause here to clarify my main argument. I am not advocating the elimination of all struggles during digital learning projects. As many education theorists have pointed out, students (and teachers) learn from challenges. Inoculation is not a cure-all; complications will still arise, problems will emerge, and projects will not always go smoothly. The difference—and this is an important difference—is that, with the aid of inoculation theory, students may be better equipped to interpret and think through the challenges, shifting their focus from their frustration to ways of working through the complications. This is an important distinction in my argument: It's not just that inoculation will prepare students for ways of addressing specific technology complications (e.g., a blog post won't post, so what can I do about this?), but more importantly, that inoculation will help students to think more carefully, more critically about the use of technology (e.g., I wonder what other problems I might face when using this technology? What are some other impacts of using this specific technology to meet this specific goal?). More robust thinking can help students to interpret the challenges in ways that are more productive to learning.

Applying inoculation theory to digital learning challenges answers a call for thinking more broadly about Net Generational learning. As Mishra, Koehler, and Kereluik (2009) put it, a "focus on specific technologies instead of broader, generative frameworks of thought will always be limited, preventing us from keeping up with the rapid pace of change of technology and ultimately

make us fall behind" (p. 50). It also offers a more nuanced perspective of technology—not only its benefits, but also its costs—which helps us better understand how Net Generational students learn. As Hartman, Moskal, and Dziuban (2005) summarized: "To a great extent, the behaviors of the Net Gen are an enactment of the capabilities afforded by modern digital technologies" (p. 6.3).

I contend that inoculation theory provides a particularly enlightening "framework of thought"—for teachers and Net Generational students using digital learning technologies. Besides the practical implications of approaching digital learning from an inoculation theory perspective, we also gain pedagogical insight by looking at a bigger picture—a theory-guided perspective of the benefits and drawbacks of approaches that characterize Net Generational learning.

## RECOMMENDATIONS

Applying inoculation theory to the development and communication of digital learning projects can help to prevent, or at least lessen, two potential adverse effects of digital learning: (1) frustration caused by technological problems such as failed equipment or unclear instructions (see Sang, Valcke, van Braak, & Tondeur, 2010) or not knowing how to use a specific type of technology (see Kvavik, 2005, McNeely, 2005); and (2) an overemphasis on quick information retrieval (see Barnes, Marateo, & Ferris, 2007) and risks of superficial knowledge engagement, or "shallow thinking" (Barnes, Marateo, & Ferris, 2007, para. 20). Raising and refuting potential challenges before beginning a digital learning project may gain both of these benefits. We consider these two areas next, beginning with the pragmatic benefit of preparing students for potential technology problems.

Inoculation can lessen to-be-expected complications with technology. Of course, technology can help students learn (e.g., Blumenfeld et al., 1991). But technology can also be frustrating—for students and for teachers. If the frustration affects attitudes and/or perceptions of efficacy (self-efficacy or technology-specific efficacy), this can discourage the use of technology for learning (Sang, Valcke, van Braak, & Tondeur, 2010). For students, the frustrations may come from a number of barriers, including perceptions that technology is "of limited usefulness or too difficult to learn" (Blumenfeld et al., 1991, p. 378) or when students have not been taught a specific skill needed to use the technology (Kvavik, 2005; McNeely, 2005). Similarly, teachers can experience frustration with technology, for example, when technology does not work properly (Woelk, 2008) or when institutional support is limited (Woelk, 2008). One principal summarized teacher frustrations toward technology: "If you are pushing yourself to really learn stuff...you're going to have technical problems. It's going to be frustrating, and you'll want to take an ax to things" (Bryson & de Castell, 1998, p. 552). But there may be another option besides an ax—something that offers more precision and is proactive instead of reactive: inoculation.

Following the tenets of inoculation theory, teachers can predict and share potential digital learning challenges with their students—and solutions (or refutations) of these challenges—before they happen, possibly preempting some of the frustration when the obstacles are eventually confronted. By talking with students about possible or probable complications, these influences are raised and refuted before they occur—a format that reflects inoculation theory. It is not that challenges won't occur, but instead, that students are better prepared for the challenges when they do.

In my own courses, prior to extensive use of the Blackboard Learning System (an online-based education system, see www.blackboard.com), I talk about some challenges students—and teachers—have had in the past, and then ways we have worked through the challenges. For example, I offer some hypothetical situations about students who have posted work to Blackboard only to

discover later that the post did not upload. I show them a simple way to double-check that assignments have been posted. This simple example offers a counterattitudinal argument ("Online blogging isn't reliable because work sometimes doesn't post when students think that it has") and a refutation of that argument ("We can confirm and prevent misunderstandings about whether our work has been posted"). This raises and refutes a potential—and common—challenge before it occurs. And as we learn from nearly fifty years of inoculation scholarship, inoculation does more than teach specific refutations (e.g., how to confirm that a blog post is actually posted); inoculation also motivates more robust, more nuanced, and longer-lasting thinking about the issue (Compton & Pfau, 2005). Considering one potential complication leads to thinking about other complications—and how to overcome other complications.

This is one approach teachers can use to utilize inoculation theory in introducing and describing digital learning projects: pointing toward specific problems that might arise during the course of the project and offering ways to overcome such challenges. Additionally, teachers can use a more generic counterargument-refutation message strategy when introducing digital learning projects. As an example of this inoculation strategy, a teacher can mention, in general, that students will likely experience technological difficulties with digital learning projects, and then provide different ways of interpreting or reframing technological challenges. For example, students can be encouraged to consider struggles that occur during projects "as attempts to make meaning and to solve difficult and demanding problems" (Blumenfeld et al., 1991, p. 379). I use a similar approach when I describe the Blackboard component of my speech courses on my syllabus, beginning with: "We will frequently use online blogging to facilitate our goals in the course. Some characteristics of online blogging can be frustrating, so let me share some thinking about why I use it so much in this course." I then describe my aims with the use of technology in my course, a discussion that takes place in the context of potential frustrations with the technology. This approach, while more generic than a point-by-point analysis of specific challenges (e.g., confusions about whether an assignment has posted), reflects the framework of inoculation theory: counterarguments ("Digital learning projects can be frustrating") and refutation(s) ("Despite frustrations, digital learning projects offer a number of benefits").

The key, whether offering specific two-sided messages or more generic ones, is to raise and refute digital learning complications *before* the challenges arise. Teachers can include this information in early-in-the-term course overviews and/or the syllabus, or teachers can tailor an approach to each digital learning project as it is assigned. Inoculation-informed communication about digital learning projects reflects a deeper approach of integrating digital learning projects into classroom curriculum—an approach that not only considers potential challenges, but also includes acknowledgements of challenges in the design and communication of digital learning projects. The goal is not to avoid the complications, but instead, to help students begin thinking more carefully and critically about technology as the project progresses.

## BENEFITS

In the process of preparing such inoculation-based messages, teachers benefit by looking ahead and thinking through potential complications. Teachers get a better understanding of the potential problems, helping them make more informed decisions about how (or whether) to use digital learning technology for each particular project. Inoculation-based messages educate recipients of the messages as well as the creators of the messages.

We find clear practical benefits of digital learning project discussions guided by inoculation theory. But other benefits move beyond overcoming technological problems by influencing how students understand pedagogical considerations that inform digital learning projects.

Inoculation effects endure. Like the medical vaccine that gave inoculation its name, inoculation needs time to confer resistance (see McGuire, 1964). In a medical inoculation, this time is needed for the body to develop antibodies in protection against a future virus. In an attitudinal inoculation, time is needed for those inoculated to think more about the issues, to raise and refute additional counterarguments, a process that bolsters the position or attitude (Compton & Pfau, 2005). One study found that inoculation messages motivate active thinking about an issue that endures for at least 44 days (Pfau et al., 2004). Another found some attitudinal effects of inoculation lasting for several months (Pfau & Van Bockern, 1994). Talking about digital learning projects using a two-sided message format—raising and refuting potential challenges before they occur—unleashes a process that keeps students thinking about the issues. An inoculation-informed message gives students something to think about—and the motivation to keep thinking. Notably, the type of thinking unleashed by inoculation includes multiple perspectives on an issue—a possible antidote to hasty generalizations and superficial thinking (Barnes, Marateo, & Ferris, 2007).

For example, telling students at the start of a project that they will be blogging may provide the basic details of the project, but it does little to motivate—let alone sustain—student interest in the technology and the implications of the technology on their learning. However, an inoculation-informed description of the assignment would raise and refute potential challenges with using blogging as a learning project. Students could be encouraged to consider, for example, how writing for a general audience will create limitations on their use of more specialized terminology. Or, students could consider how audience expectations for frequent postings may impact how, what, and when they write. Inoculation scholarship suggests that raising and then responding to these challenges—prior to the actual challenges—motivates a process of thinking that continues for days—and even months (Pfau & Van Bockern, 1994).

Consequently, with longer periods of contemplation and information processing, inoculation promotes deeper, more careful thinking about issues, and this can deepen students' understandings and attitudes about connections between technology and learning—a goal with digital learning (see Mishra, Koehler, & Kereluik, 2009). As Brown (2005) points out, "In 1900, learning consisted largely of memorization; today it relies chiefly on understanding" (p. 12.4). Inoculation, in contrast to other message strategies, not only provides more complex information (e.g., two or more sides of issues), but also serves as a catalyst for more thinking about the issue, beyond what is included in the message (Compton & Pfau, 2005; McGuire, 1964) and this may lead to deeper understanding.

Furthermore, inviting students to think through the project—before the project begins—involves them more deeply in the projects, and "[a]ctively involving the end user in the design process can break down some...barriers" that lead to technology resistance (Joseph, 2010, p. 146). Teachers can work with their students to generate a list of potential challenges they may face when working with a specific technology, or with technology in general. For example, I use video recording technology in several of my courses, and my students have been among my most valuable resources for information about how video files are best viewed on the campus network (practical implications) as well as how video technology has affected how they assess their work (pedagogical implications). Teachers are not restricted to a linear, lecture format when talking with their students about potential or probable technology complications; instead, the requisite counterarguments and refu-

tations can—and in most cases, should—emerge through dialogue with students.

These characteristics of inoculation theory-motivated thinking help to alleviate potential side effects of digital learning: "the habits of instant gratification and shallow thinking" (Barnes, Marateo, & Ferris, 2007, para. 20). By prolonging thinking about the issues, inoculation theory protects against hasty generalizations; by motivating a consideration of counterarguments and refutations, inoculation theory protects against shallow thinking. We may find that inoculation not only helps Net Generational students to work through technological problems, but also, helps Net Generational students to think more carefully and deliberately about technology as a part of learning.

## FUTURE RESEARCH DIRECTIONS

While I am an advocate for raising and refuting potential challenges to digital learning project success prior to the start of a project, a number of questions continue to motivate my own thinking, practice, and research. These areas warrant future study as we continue considering ways that inoculation theory can guide discussions with Net Generational students about digital learning projects in the classroom.

Some technology barriers are there for a reason or reasons, and it is worth noting that some complications or frustrations with technology shouldn't be inoculated against. A specific project design may not be the best way to meet a course objective, or the technology may not be used effectively for the needs of the project. Just as students should be prepared to confront and overcome some barriers to digital learning projects, teachers should also be prepared—and open toward—reconsidering the aims of the projects themselves. Teachers should not merely collect potential counterarguments against a project to design inoculation messages; each potential counterargument should be given fair hearing. Otherwise, there is a chance that we could inoculate against barriers that are there for a reason.

On a related note, future research should also consider whether inoculation-based messages help to define frustrations or challenges as problems to be confronted rather than simply ignored. Under some conditions, students may not become frustrated when using technology (see Combes, 2008), and instead of working through a problem, they may simply stop and try something else. Holman (2011) found that students are not always able to identify problems when using online searches, for example. Future research may find that inoculation helps to identify challenges as problems that can be overcome instead of problems to be ignored.

Effectiveness of inoculation theory-based discussions needs empirical testing in the context of classroom digital learning projects. Just as continual assessment is important for us to consider (and reconsider) the effectiveness of digital learning projects in the classroom, we should continue to assess the effectiveness of inoculation theory as a guide for digital learning project discussions. Inoculation boasts an impressive track record of success in conferring resistance to influence—with an impressive amount of empirical support for its ability to affect responses to challenges (Banas & Rains, 2010; Compton & Pfau, 2005). But we need more investigations of inoculation as a classroom communication approach. As part of this needed research, scholars should also consider any potential "side effects" of inoculation treatments. For example, the process of inoculation can elicit affect responses (e.g., anger, see Pfau et al., 2009), and research should consider whether any of these emotional responses could serve as distractions.

The focus of this chapter was on considering inoculation theory applications in talking about digital learning projects in a traditional classroom setting. However, one may also be able to apply aspects of inoculation theory to communication and project design in an online course. Teachers

of online courses could turn to inoculation theory to help preempt specific technology complications and promote the type of active thinking that we have explored in this chapter.

## CONCLUSION

Talking about projects—at length and in depth—does not need to be a dilatory phase of course instruction; if such discussions are thoughtful and strategic, such discussions become vibrant parts of instruction and of learning. This chapter proposed that turning to inoculation theory is one way to improve our discussions with Net Generational students about digital learning projects. As Oblinger and Oblinger (2005) remind us: "It isn't the technology per se that makes learning engaging for the Net Gen; it is the learning activity" (p. 2.16). Inoculation may function as a strategy for preempting frustrations with technology that turns focus away from the learning activity—distractions that can impede learning.

By raising and refuting potential challenges, inoculation theory can guide discussions about digital learning projects, transforming linear descriptions (e.g., telling students about the project) into descriptions that are more complex and more interesting. Discussions with Net Generational students about digital learning projects should be as dynamic and active as the projects themselves, and inoculation adds a layer of complexity that enhances student learning. It is appropriate that conversations about digital learning are dynamic, thought provoking, and robust—all characteristics that we can also apply to inoculation theory.

## REFERENCES

Banas, J. A., & Raines, S. A. (2010). A meta-analysis of research on inoculation theory. *Communication Monographs, 77*(3), 281–311. doi:10.1080/03637751003758193

Barnes, K., Marateo, R. C., & Ferris, S. P. (2007). Teaching and learning with the net generation. *Innovate, 3*(4).

Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychology, 26*(3 & 4), 369–398.

Brown, M. (2005). In Oblinger, D., & Oblinger, J. (Eds.), *Educating the net generation* (pp. 12.1–12.22). Boulder, CO: EDUCAUSE.

Bryson, M., & de Castell, S. (1998). New technologies and the cultural ecology of primary schooling: Imagining teachers as Luddites in/deed. *Educational Policy, 12*(5), 542–567. doi:10.1177/0895904898012005005

Coiro, J. (2003). Exploring literacy on the Internet: Reading comprehension on the Internet: Expanding our understanding of reading comprehension to encompass new literacies. *The Reading Teacher, 56*(5), 458–464.

Combes, B. (2008). *The Net generation: Tech-savvy or lost in virtual space?* Paper presented at the IASL Conference: World Class Learning and Literacy through School Libraries.

Compton, J., & Pfau, M. (2005). Inoculation theory of resistance to influence at maturity: Recent progress in theory development and application and suggestions for future research. In Kalbfleisch, P. (Ed.), *Communication yearbook 29* (pp. 97–145). Mahwah, NJ: Lawrence Erlbaum.

Compton, J., & Pfau, M. (2008). Inoculating against pro-plagiarism justifications: Rational and affective strategies. *Journal of Applied Communication Research, 36*(1), 98–119. doi:10.1080/00909880701799329

Haigh, M. M., & Pfau, M. (2006). Bolstering organizational identity, commitment, and citizenship behaviors through the process of inoculation. *The International Journal of Organizational Analysis, 14*(4), 295–316. doi:10.1108/19348830610849718

Hartman, J., Moskal, P., & Dziuban, C. (2005). Preparing the academy of today for the learner of tomorrow. In Oblinger, D., & Oblinger, J. (Eds.), *Educating the net generation* (pp. 6.1–6.14). Boulder, CO: EDUCAUSE.

Havelka, D. (2003). Students beliefs and attitudes toward information technology. *Information Systems Education Journal, 1*(4), 3–9.

Holman, L. (2011). Millennial students' mental modes of search: Implications for academic librarians and database developers. *Journal of Academic Librarianship, 37*(1), 19–27. doi:10.1016/j.acalib.2010.10.003

Joseph, R. C. (2010). Individual resistance to IT innovations. *Communications of the ACM, 53*(4), 144–146. doi:10.1145/1721654.1721693

Kvavik, R. B. (2005). Convenience, communications, and control: How students use technology. In Oblinger, D., & Oblinger, J. (Eds.), *Educating the net generation* (pp. 7.1–7.20). Boulder, CO: EDUCAUSE.

Liaw, S.-S., Huang, H.-M., & Chen, G.-D. (2007). Surveying instructor and learner attitudes toward e-learning. *Computers & Education, 49*, 1066–1080. doi:10.1016/j.compedu.2006.01.001

Lumsdaine, A. A., & Janis, I. L. (1953). Resistance to counterpropaganda produced by one-sided and two-sided propaganda presentations. *Public Opinion Quarterly, 17*, 311–318. doi:10.1086/266464

McEuen, S. F. (2001). How fluent with information technology are our students? *EDUCAUSE Quarterly, 4*, 8–17.

McGuire, W. J. (1964). Inducing resistance to persuasion: Some contemporary approaches. In Berkowitz, L. (Ed.), *Advances in experimental social psychology* (*Vol. 1*, pp. 191–229). New York, NY: Academic Press. doi:10.1016/S0065-2601(08)60052-0

McNeely, B. (2005). Using technology as a learning tool, not just the cool new thing. In Oblinger, D., & Oblinger, J. (Eds.), *Educating the net generation* (pp. 4.1–4.10). Boulder, CO: EDUCAUSE.

Mishra, P., Koehler, M. J., & Kereluik, K. (2009). The song remains the same: Looking back to the future of educational technology. *TechTrends, 53*(5), 48–53. doi:10.1007/s11528-009-0325-3

Oblinger, D., & Oblinger, J. (2005). Is it age or IT? First steps toward understanding the Net Generation. In Oblinger, D., & Oblinger, J. (Eds.), *Educating the net generation* (pp. 2.1–2.20). Boulder, CO: EDUCAUSE.

Pfau, M. (1995). Designing messages for behavioral inoculation. In Maibach, E., & Parrott, R. L. (Eds.), *Designing health messages: Approaches from communication theory and public health practice* (pp. 99–113). Newbury Park, CA: Sage Publications.

Pfau, M., & Burgoon, M. (1988). Inoculation in political campaign communication. *Human Communication Research, 15*(1), 91–111. doi:10.1111/j.1468-2958.1988.tb00172.x

Pfau, M., Compton, J., Parker, K. A., Wittenberg, E. M., An, C., & Ferguson, M. (2004). The traditional explanation for resistance based on the core elements of threat and counterarguing and an alternative rationale based on attitude accessibility: Do these mechanisms trigger distinct or overlapping process of resistance? *Human Communication Research, 30*, 329–360. doi:10.1093/hcr/30.3.329

Pfau, M., & Kenski, H. C. (1990). *Attack politics: Strategy and defense*. New York, NY: Praeger.

Pfau, M., Semmler, S. M., Deatrick, L., Mason, A., Nisbett, G., & Lane, L. (2009). Nuances about the role and impact of affect in inoculation. *Communication Monographs, 76*(1), 73–98. doi:10.1080/03637750802378807

Pfau, M., & Van Bockern, S. (1994). The persistence of inoculation in conferring resistance to smoking initiation among adolescents: The second year. *Human Communication Research, 20,* 413–430. doi:10.1111/j.1468-2958.1994.tb00329.x

Sang, G., Valcke, M., van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education, 54,* 103–112. doi:10.1016/j.compedu.2009.07.010

Smart, B., & Desouza, K. (2007). Overcoming technology resistance. *Business Strategy Review,* 25-28.

Woelk, K. (2008). Optimizing the use of personal response devices (clickers) in large-enrollment introductory courses. *Journal of Chemical Education, 85*(10), 1400–1405. doi:10.1021/ed085p1400

Wood, M. L. M. (2007). Rethinking the inoculation analogy: Effects on subjects with differing preexisting attitudes. *Human Communication Research, 33,* 357–378. doi:10.1111/j.1468-2958.2007.00303.x

## KEY TERMS AND DEFINITIONS

**Counterarguing:** A process of raising and refuting challenges to a current position; reflects an active way of thinking about a position which can involve more critical thinking.

**Inoculation Effects:** Changes to attitudes, affect, behaviors and/or thinking following exposure to an inoculation pretreatment message; the primary goal of inoculation is to confer resistance, or protection of a position, attitude, and/or belief.

**Inoculation Pretreatment Message:** A message that raises and refutes challenges to a position, attitude, or belief before stronger challenges occur.

**Inoculation Theory:** A theory first introduced by William McGuire that explains how resistance to future challenges can be conferred through preemptive exposure to weakened versions of future challenges.

**Threat:** Recognition of vulnerability of an existing position; motivates more thinking about a position.

# Teaching, Learning, and the Net Generation:

## Concepts and Tools for Reaching Digital Learners

Sharmila Pixy Ferris
*William Paterson University, USA*

Information Science
REFERENCE

Managing Director: Lindsay Johnston
Senior Editorial Director: Heather Probst
Book Production Manager: Sean Woznicki
Development Manager: Joel Gamon
Development Editor: Hannah Abelbeck
Acquisitions Editor: Erika Gallagher
Typesetter: Christopher Shearer
Print Coordinator: Jamie Snavely
Cover Design: Nick Newcomer, Greg Snader

Published in the United States of America by
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com



Library of Congress Cataloging-in-Publication Data

Teaching, learning, and the net generation: concepts and tools for reaching digital learners / Sharmila Pixy Ferris.
p. cm.
Includes bibliographical references and index.
Summary: "This book provides pedagogical resources for understanding digital learners, and effectively teaching and learning with today's generation of digital natives, offering a much-needed resource that moves beyond traditional disciplinary and geographical boundaries, bridges theories and practice, and addresses emerging issues in technology and pedagogy"--Provided by publisher.
ISBN 978-1-61350-347-8 (hardcover) -- ISBN 978-1-61350-348-5 (ebook) -- ISBN 978-1-61350-349-2 (print & perpetual access) 1. Educational technology. 2. Generation Y--Education. I. Ferris, Sharmila Pixy.
LB1028.3.T3857 2012
371.33--dc23
2011032912

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.