

3-D printing machine. Photo by Guy Sie, via Wikimedia Commons.

Emerging and Alternative Methods

Several other 3D printing methods are also emerging. In material jetting, an inkjet printer head deposits liquefied plastic or other light-sensitive material onto a surface, which is then hardened with UV light. Another inkjet printing technique is binder jetting, which uses an inkjet printer head to deposit drops of glue-like liquid into a powdered medium. The liquid then soaks into and solidifies the medium. In directed energy deposition (DED), metal wire or powder is deposited in thin layers over a support before being melted with a laser or other heat source. Sheet lamination fuses together thin sheets of paper, metal, or plastic with adhesive. The

resulting object is then cut with a laser or other cutting tool to refine the shape. This method is less costly but also less accurate than others.

The Future of 3D Printing

While AM techniques have been in use since the 1980s, engineers believe that the technology has not yet reached its full potential. Its primary use has been in rapid prototyping, in which a 3D printer is used to quickly create a 3D model that can be used to guide production. In many cases, 3D printing can create objects that are stronger, lighter, and more customizable than objects made through machining. Printed parts are already being used for planes, race cars, medical implants, and dental crowns, among other items. Because AM wastes far less material than subtractive manufacturing, it is of interest for conservation, waste management, and cost reduction. The technology could also democratize manufacturing, as small-scale 3D printers allow individuals and small businesses to create products that traditionally required industrial manufacturing facilities. However, intellectual property disputes could also occur more often as 3D printing becomes more widespread.

—Micah L. Issitt

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first; attention to curriculum was inserted later.” Although the language was changed, it was changed “without considerable rethinking or rewriting of the volume” (Sosniak). As a result, the Taxonomy has not informed the practice of curriculum development to the extent its popularity suggests. In addition, Sosniak speculates, the trend toward increased specificity and detail in educational objectives has made it burdensome for teachers to incorporate them into lesson plans. Finally, disagreement about the nature of objectives—specifically, whether behavioral-based objectives represent all kinds of learning—limited their use in the classroom.

Moreover, the way the educational community talks about student learning goals has changed over time. “The same forces that have moved the field away from the term *behavioral objectives* may also be moving the field away from *instructional objectives*,” Marken and Morrison write. “If there has been a shift over the last several decades from a focus on training and instruction to a focus on education and learning, then it is perhaps not surprising to see a reduction in the terms *instructional* and *behavioral objectives* and a rise in the use of *educational* and *learning objectives*.”

Anderson corroborates the limited impact of the Taxonomy on teachers, despite the heavy emphasis teacher education programs place on the use of the Taxonomy in the classroom. Thus, even though teachers learn how to use the Taxonomy to plan lessons, prepare tests, ask questions, and assign classroom tasks, research suggests teachers no longer rely on the Taxonomy once they begin teaching on their own. Studies show most teachers develop lesson plans in terms of what they want students to do (e.g., activities) as opposed to what they want students to learn (e.g., outcomes). In addition, teachers continue to focus their instruction and evaluation on lower-order thinking; a recent review of over 9,000 test items revealed that over 80 percent were written at the lowest level of the Taxonomy.

Marzano, in an effort to support the application of the Taxonomy to instructor lesson-planning, published five recommendations for educators seeking to clearly delineate what they want students to learn and know. They are:

1. Create an internally consistent system.
2. Start with objectives that focus on a single unit of instruction.

3. Break the objective into a learning progression.
4. Use the learning progression to establish daily targets.
5. Translate daily targets into student-friendly language.

Although limited in terms of its impact in the classroom, the Taxonomy has made tremendous contributions to educational research. With regard to teaching methods, for example, significant empirical evidence has been found to support the notion that methods utilizing one-way communication (e.g., lecture) help students achieve lower-order objectives, while methods requiring two-way communication (e.g., group activities) foster higher-order objectives. Similarly, research has shown that real-world experiences facilitate the attainment of higher-order objectives to a greater extent than classroom activities. Within the classroom, descriptive studies reveal that teacher questioning focuses on lower-order objectives, with only 20 percent of questions actually requiring students to think (Anderson). This finding is consistent across age, subject matter and ability level.

Viewpoints

While some may quibble about whether the Taxonomy is a useful tool for classroom teachers, others take issue with the Taxonomy itself. The following section will briefly outline some of the philosophical and empirical arguments against the guiding principles and content of the Taxonomy, and end with a word about how the Taxonomy has evolved in response to such criticism.

Furst summarizes the arguments of many of the critics, taking aim first at the author’s claim of impartiality and neutrality. A taxonomy of educational objectives that excludes any and all objectives that cannot be behaviorally specified, he argues, is inherently partial. Secondly, he outlines philosophical arguments against the separation of content from process. Referencing the philosophy of Wittgenstein, who insisted on the study of particulars as opposed to the development of general categories, Furst stresses the artificiality of such a separation. The process of remembering, for example, cannot be separated from the remembering of some *thing*. The separation of the cognitive domain from the affective domain has also garnered critical attention, for

questions should be asked and how to measure student learning via electronic texts. It is clear that electronic texts will continue to exist for a long time. Further, there are many advantages to desktop and e-publishing. Therefore, communication researchers are searching for ways to take advantage of these new tools and capabilities while ensuring that the public is still able to evaluate the information presented to them, and that academics are able to determine if the information they are reviewing has been properly reviewed.

—Allison Hahn

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DIGITAL CITIZENSHIP

Introduction

Digital citizenship can be defined as the norms and rules of behavior for persons using digital technology in commerce, political activism, and social communication. Digital citizenship is a unique phenomenon of the digital age, reflecting the growing importance of digital literacy, digital commerce, and information technology in global culture. A person's digital citizenship begins when they engage with the digital domain, for instance, by beginning to use a smartphone or email. However, digital citizenship exists on a spectrum based on an individual's level of digital literacy. This can be defined as their familiarity with the skills, jargon, and behaviors commonly used to communicate and conduct commerce with digital tools.

Background

Educational theorist Marc Prensky suggested that the modern human population can be divided into two groups: digital natives and digital immigrants. Digital natives were raised in the presence of digital technology. They learned how to use it in childhood. They absorbed the basics of digital citizenship during their early development. Digital immigrants were born before the digital age or have limited access to technology. They adapt to digital technology and communication later in life. Given the growing importance of digital technology, educators and social scientists believe that teaching children and adults to use digital technology safely and ethically is among the most important goals facing society.

An Evolving Paradigm

Digital communication enables people to have relationships online or on mobile devices. The degree to which these digital relationships affect IRL relationships, or those that occur "in real life," is an

build the company. These colleagues included Allen Blue, Lee Hower, and David Eves. After six months of development, LinkedIn officially launched on May 5, 2003. Growth was slow during the first few weeks, with thirteen of the company's employees inviting 112 people to join the service. However, the growth was enough to draw the attention of venture capital firm Sequoia Capital, which became the company's first investor.

LinkedIn continued to grow and in 2008 the company opened its first international office in London, United Kingdom, and launched French and Spanish language versions. By late 2010, the company was valued at \$1.575 billion and employed almost one thousand people in ten offices around the world. The following year, LinkedIn filed for an initial public offering (IPO), so its stock could be traded on the open market. The first shares were sold on May 19, 2011, and the price of shares increased as much as 171 percent during the first day of trading on the New York Stock Exchange.

Recent statistics indicate that LinkedIn has generated \$8 billion revenue in 2020 and boasts over 756 million members. However, it is not accurately known how many users are active daily or even every month.

How It Works

LinkedIn is a professional-networking service that allows users to build business connections, look for jobs, and find potential job candidates. As of January, 2015, it is the world's largest professional network on the internet. The users of the service range from people searching for a job to executives of Fortune 500 companies. The site contains several features that enable users to connect and engage with their professional network. While many features are provided free of charge, premium subscriptions are available so that professionals can better manage their networks and business identity.

A LinkedIn professional profile contains a user's basic information and work experience. It acts as a résumé, with a focus on employment and education. There is also a section where users can provide information on certifications, specific skills, affiliated groups, and other honors. After creating a profile, users can then search for contacts by uploading their e-mail address book and by performing a general search. LinkedIn also finds colleagues based on the

employment information and education history users provide.

Unlike other social media services where a person is added as a casual "friend," network "connections" on LinkedIn typically mean that the two people know each other well as trusted business associates and can vouch for their work experience and skills. Contacts who accept a user's invitation to connect are known as "direct connections." Everyone a direct connection is affiliated with becomes a part of his or her network. How directly a user is connected to another user dictates how they can communicate with each other.

LinkedIn Groups allows users to hold a discussion about a specific business-related topic. While other social media services such as Facebook allow users to create their own groups without hindrance, a panel of professionals must first review new groups that wish to be added to LinkedIn. Once a group is allowed, that group's manager can accept or reject applications from users to join.

Many users rely on LinkedIn to stay in touch with colleagues or classmates. Others use it to actively search for jobs and post job listings. Companies that post job listings on the website must pay a fee to do so. LinkedIn's audience goes beyond employees and employers as well. Salesmen also use LinkedIn to engage with contacts in their target industry, and entrepreneurs can use the site to look for potential business partners and investors.

Popularity

Since its launch, LinkedIn has become immensely popular around the world. Initially, LinkedIn's user adoption was slow. In its first week the service had 2,500 users and after the first month this grew to 6,000. By November 2003, there were 37,000 users. After two years, the service had more than 1.7 million registered users. The company's chief executive officer, Jeff Weiner, reported that one new user was joining the site every second as of November 2010, bringing the total to 85 million.

From there LinkedIn's popularity increased dramatically as its reputation as a legitimate professional network continued to grow. In 2015, the service boasted over 400 million users in over two hundred countries and territories. As of 2020, LinkedIn reports over 690 million individual users.

—Patrick G. Cooper

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SOCIAL MEDIA AND DEPRESSION

Introduction

The Pew Research Center, which has been tracking social media use in the United States since 2005, reported that in 2015, 65 percent of adults used social networking sites, an increase of almost 60 percent over a decade. As recently as 2021, a study showed that Americans spend between five and six hours on their cell phones with 145 minutes of that time spent on social media. Young adults between ages eighteen and twenty-nine and teens were the heaviest users, with 90 percent of young adults and 92 percent of teens self-identifying as social media users. At the other end of the age spectrum, more than one third of adults sixty-five and older reported using social media. The purpose of social media is to connect people, and while this sounds benevolent,



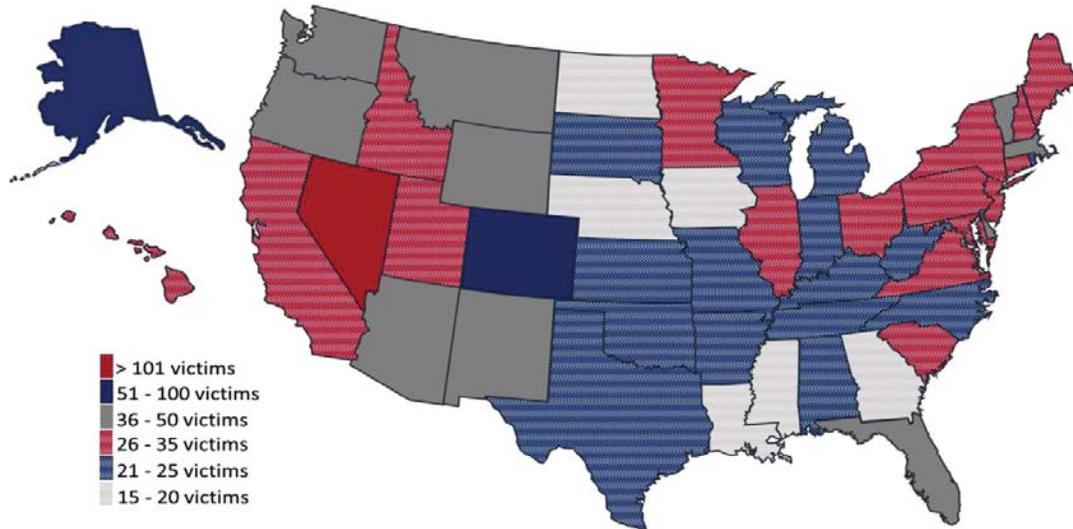
Social media can have a direct impact on emotional and mental health. Photo via iStock/martin-dm. [Used under license.]

researchers have questioned whether social media can have harmful effects. The number of stories concerning cyberbullying and harassment has increased interest in the finding an answer. The effects of social media on those suffering from depression have been of particular concern.

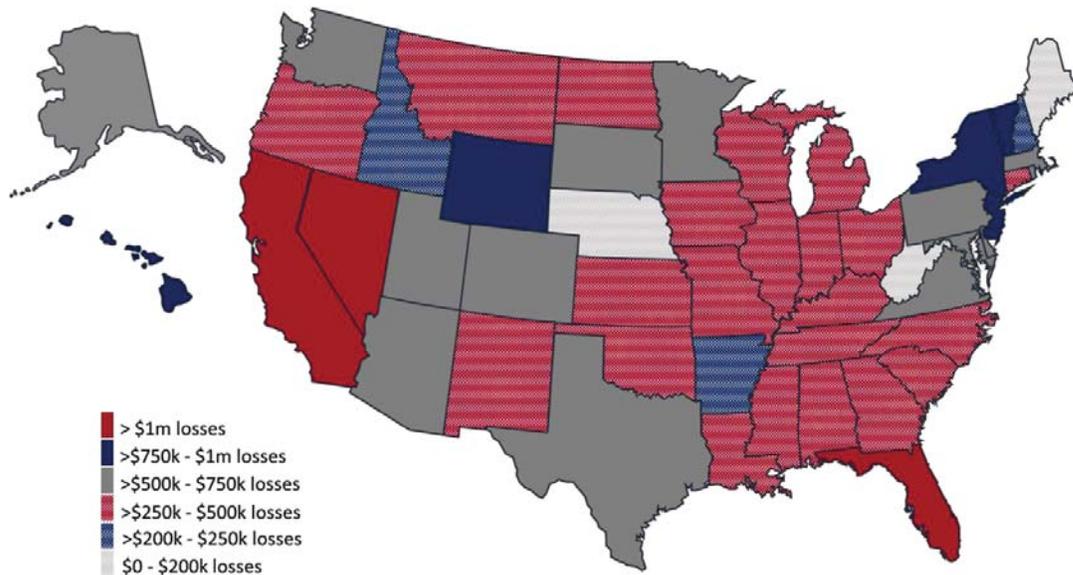
With the advent of the virus COVID-19 in 2020, social distancing with some mandated stay-at-home orders caused an increasing sense of isolation. Without physical contact with others that can trigger stress-relief hormones, work relationships, and other social outlets, humans, who are social creatures, face a serious mental health threat. Multiple social media platforms have replaced real-world contacts until such time as quarantine requirements ease. Unfortunately, too much time on social media can make the individual feel lonely and isolated and enhance feelings of anxiety and depression. While excessive use may impact feelings and mental health, it can still be a positive way to stay engaged with others and enhance well-being. Going forward, the habit of too much time on social media may need to be broken.

The use of social media may not have the same psychological benefits of in-person contact, but there are multiple positives such as staying connected with others, even virtually. For some, staying up-to-date with friends and family around the world when visits and travel are limited is a significant positive. Finding new groups online, promoting worthwhile causes and seeking or providing emotional support is also important in the use of social media especially if the individual lives in a rural or isolated area. Finding an outlet for creativity such as writing, sharing craft ideas, decorating tablescapes and

2021 – STATES BY NUMBER OF OVER 60 VICTIMS PER CAPITA⁹



2021 – STATES BY LOSSES OF OVER 60 VICTIMS PER CAPITA



⁹Per 100,000 people, based upon July 2021 U.S. Census Bureau population estimates. <https://www.census.gov>