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and Katie Davis

The App Generation

How today’s youth navigate identity, intimacy, and imagination in a digital world

Yale University Press
New Haven and London
A CONVERSATION

On a sunny though chilly day in March 2012, the two authors, Howard Gardner and Katie Davis, initiated a lengthy conversation with Katie’s sister Molly. Ten years earlier, Katie, then in her early twenties, had begun to study with Howard, then in his late fifties. Since then they have collaborated on numerous research and writing projects, including this book. At the time of the conversation, held in Howard’s office at Harvard, Molly, aged sixteen, was a junior at an independent school in New England.

Why did Howard and Katie hold and record this conversation? Since 2006, we and our fellow researchers have been examining the role technology plays in the lives of young people, often dubbed “digital natives” because they have grown up immersed in the hardware and software of the day. As researchers, we have used a variety of empirical methods to
ferret out what might be the special—indeed, defining—quality of today's young people. But we came to realize that if we were to make statements, or draw conclusions, about what is special about digital youth today, we required key points of comparison.

Being opportunistic as well as empirical, we realized that our very own family configurations provided one comparative lens—as well as a literary device—through which to observe and chronicle the changes across the generations. Howard—on any definition of that slippery term, a “digital immigrant”—grew up in northeastern Pennsylvania in the 1950s, at a time when one could still count the number of computers in the world. Born in Canada and raised in Bermuda, Katie grew up in the late 1980s and early 1990s. During her early childhood, her Bermuda home had just one television station (CBS), which eventually expanded to three (CBS, ABC, NBC). In the mid-1990s, her parents finally installed cable at their home. Katie's access to computers was limited to once-weekly classes in the computer lab at school. In sharp contrast, Molly, who has lived in Bermuda and the United States, cannot remember a time without desktops, laptops, mobile phones, or the Internet. Wedded to her smartphone, this prototypical digital native spent her adolescence deeply immersed in Facebook, Twitter, and other social networking communities. And so our conversation across the generations—and subsequent communications among the three of us—catalyzed comparisons of three dramatically different relations to the technologies of the time.

Although our conversation ranged widely, three topics emerged as dominant and also permeate this book: our sense of personal identity, our intimate relationships to other persons, and how we exercise our creative and imaginative powers (hereafter, the three Is). To be sure, the nature of our species has not changed fundamentally over time. And yet we maintain that, courtesy of digital technologies, Identity, Intimacy, and Imagination have each been reconfigured significantly in recent decades. Signs of these changes can be discerned in our conversation.

As the dominant (though slightly waning) online community among both Molly's and Katie's peer groups, Facebook was a recurrent topic of discussion. Though they are Facebook friends, the sisters employ the popular social networking site in different ways. Having joined as an adult in her late twenties, Katie uses Facebook intermittently to stay connected to friends and family living across Canada, the United States, and Bermuda. For Molly, Facebook represents a far more integral part of her daily experience. Since she joined at the age of twelve, Facebook has represented a vital social context throughout her formative adolescent years.

In describing her use of and experiences on Facebook, Molly touched on a practice among some of her peers that made an immediate and striking impression on both Howard and Katie. As is the case at just about every high school, one group of students at Molly's school are considered the
popular kids. The girls are attractive and the boys play varsity sports like lacrosse and soccer. Most of the varsity boys are seniors, but a few stand-out athletes are freshmen. A while back, Molly noticed that some of the senior girls who were dating senior boys started to show up on her Facebook newsfeed as being “married.” Only they were married, not to their actual boyfriends, but to the freshmen boys who played on the same sports team.

"The popular senior girls pick out a freshman guy who is cute and popular and probably going to be really attractive when he's older. They'll kind of adopt him, and then take pictures with him, write on his wall, and flirt with him in a joking sort of way. The boys are kind of like their puppets."

Howard was surprised by this practice, noting that we typically think of girls in high school and college as being on the lookout for older men. "When I went to school, the junior and senior girls were all trying to go out with college guys."

Molly patiently explained that it's not about a real desire to date freshmen boys—after all, the girls are already dating senior boys. It's more of an initiation and reinforcement of social status. The freshmen boys are accepted into the social life of the sports team by way of the girls, who themselves use their “Facebook marriages” as further confirmation of their connection to the senior boys.

Why open with this anecdote? Because, in addition to representing an intriguing example of youth culture in a digital era, it touches on all three of the central themes in this book. With respect to personal identity, the Facebook marriage between freshman boy and senior girl is an act of public performance that forms part of a teen's carefully crafted online persona. Given its orientation toward an online audience, this external persona may have little connection to the teen's internal sense of self, with its associated values, beliefs, feelings, and aspirations. Yet paradoxically, if inadvertently, this electronic betrothal may contribute to an emerging sense of identity.

Issues of intimacy arise when we consider the new forms of social connection and interaction that have emerged with the rise of digital media. (It's hard to come up with an analog version of the Facebook marriage.) Though we identified positive aspects to these online connections in our research, the depth and authenticity of the relationships they support are sometimes questionable. Molly observed: "You never see [the senior girls and freshmen boys] hanging out as if they're good friends, like I can't see them going to each other with a problem or anything like that. But they're really good at putting on this kind of persona on Facebook of 'Everything is great and we're all friends and nothing is wrong here.'" Consider, too, that Molly, who rarely comes in contact with these teens in person, is nevertheless connected to them on Facebook.

Our final theme is imagination, and there's no doubt that the Facebook marriage represents an imaginative expression, if not leap. In our conversation Howard observed: "It's a bit like in mythology, the older queen picking the younger lad who has to perform for her." Of particular note is the fact that this specific act of expression is dependent on—indeed, probably inspired by—the relationship status options available on
Facebook ("married," "single," "in a relationship," "it's complicated"). In this way, the Facebook marriage illustrates how digital media give rise to new forms of imaginative expression, just as the format of this application shapes and restricts these expressions in distinct and distinctive ways.

**OUR CHARACTERIZATION: THE APP GENERATION**

So much for our conversation and the themes and insights contained therein. We believe that one can find similar trends and manifestations across other areas that we might have surveyed—say, how one thinks about education or childrearing, religion or politics, work or play, personal morality or ethics at the workplace. (We consider some of these spheres at the end of the book.) The digital media leave few areas untouched—and their influences going forward promise to be equally dramatic and equally difficult to anticipate.

Yet we've become convinced that a single characterization best captures what is special about the changes digital media have wrought to this point. We capture this insight with the epithet the "App Generation." An "app" or "application" is a software program, often designed to run on a mobile device, that allows the user to carry out one or more operations. As captured in the photograph here, apps can be narrow or broad, simple or grand, and in either case are tightly controlled by the individual or organization that designed the app. Apps can access tunes or the *New York Times*, enable games or prayers, answer questions or raise new ones. Crucially, they are fast, on demand, just in time. You might think of them as shortcuts: they take you straight to what you're looking for, no need to perform a web search or, if determinedly old-fashioned, a search through your own memory.

It's our argument that young people growing up in our time are not only immersed in apps: they've come to think of the world as an ensemble of apps, to see their lives as a string of ordered apps, or perhaps, in many cases, a single, extended, cradle-to-grave app. (We've labeled this overarching app a
Whatever human beings might want should be provided by apps; if the desired app doesn’t yet exist, it should be devised right away by someone (perhaps the seeker); and if no app can be imagined or devised, then the desire (or fear or conundrum) simply does not (or at least should not) matter.

Let’s consider a familiar task of life and how an ensemble of apps has increasingly taken over how we accomplish it: finding your way from point A to point B. A century ago, if one wished to make one’s way from Harvard Square in Cambridge, Massachusetts, to Boston’s North End, one had a few options. One could ask a friend or passerby for written or oral directions, rely on one’s memory of a previous journey, or look at a map of the greater Boston area and plan one’s path by foot or some other mode of transportation. At the extremes, there were other choices: one could embark on a random walk (risking the possibility of never getting there). Or, like the proverbial Charlie from the Kingston Trio’s famous song who got stuck on the Boston subway system and “never returned,” one could take the MBTA. Or one could ask an organization (in later years, the American Automobile Association) for a TripTik—a fool-proof, block-by-block itinerary.

While some readers will remember these times, to contemporary consciousness they seem hopelessly old-fashioned. In recent years, many of us have in our hands or in our vehicles a device that informs us of our precise position in space, directs us from that position to our desired location, and, if for any reason we deviate from the preferred route, adjusts its directions accordingly. For all practical purposes, such GPS systems are apps that remove uncertainty from our journey. Indeed, you might decide to use your smartphone as a navigation system by calling up Google Maps. Such apps not only give us extremely detailed maps of locations; drawing on our known and inferred preferences and the reviews of other users, they inform us about options every step of the way, such as nearby restaurants, cafés, or points of interest. We can say that these apps allow error-free navigation even as they seek to satisfy all of our possible needs and desires en route.

With respect to a life with foolproof navigational aids, after Howard delivered a talk on education to a college audience, a bright and somewhat aggressive student brandishing his smartphone approached Howard. Flashing a grin, he said, “In the future, why will we need school? After all, the answers to all questions are—or soon will be—contained in this smartphone.” Howard reflected for a moment and then responded, “Yes, the answers to all questions . . . except the important ones.” A world permeated by apps can in many ways be a wondrous one; and yet, we must ask whether all of life is—or should be—simply a collection of apps or one great, overarching super-app.

Apps are great if they take care of ordinary stuff and thereby free us to explore new paths, form deeper relationships, ponder the biggest mysteries of life, forge a unique and meaningful identity. But if apps merely turn us into more skilled couch potatoes who do not think for ourselves, or pose new questions, or develop significant relationships, or fashion an appropriate, rounded, and continually evolving sense of self,
then the apps simply line the road to serfdom, psychologically speaking. One can get from Harvard Square to the North End with one's eyes wide open or one's eyes shut tight. In what follows, we attempt to capture this contrast neologistically: apps that allow or encourage us to pursue new possibilities are app-enabling. In contrast, when we allow apps to restrict or determine our procedures, choices, and goals, we become app-dependent.

In informal terms, we've introduced the problematic of this book and hinted at the answers we detail in the pages that follow. But we are hardly the first to have attempted a description of the current generation of young persons, nor are we alone in seeking to link the profile of today's youth to the influence of digital media. Indeed, hardly a day goes by without some pundit singing the praises or lamenting the costs of a life dominated by digital devices. And hardly a fortnight goes by without a major essay or book on the topic. Before plunging into the details of our study, we owe the reader an explanation of what is special about our endeavor and the book it has spawned.

Although some of the current thinking and writing about digital youth is notable, the ratio of claims made to data gathered and analyzed systematically is embarrassingly, indeed unacceptably, high. We have attempted to redress this imbalance. Over the past five years, our research team at Harvard has carried out a number of convergent studies on the nature of today's youth. Using a variety of methods, we have sought to understand to what extent, and in which ways, the youth of today may differ from their predecessors.

To begin with, we've observed young people, talked with them, eavesdropped (with permission!) on conversations dedicated to bland topics like “today's youth” or stimulated by more provocative conversation-openers like “What do we owe to our parents and for what should we blame them?” Some of these conversations have been recorded, others reconstructed based on notes we've taken.

In formal work, guided by protocols, we've conducted systematic interviews with approximately 150 young people living in the New England area and a smaller sample in Bermuda. The New England interviews were conducted between 2008 and 2010 as part of a project examining the ethical dimensions of young people's digital media activities. For this project, we spoke with youth spanning middle schoolers up to recent college graduates about their experiences with digital media, including any “thorny” situations they'd encountered online. We also interviewed twenty girls who had been blogging throughout their middle and high school years in an online journaling community called LiveJournal. The remaining youth interviews were conducted in Bermuda with students ranging from the eighth through twelfth grades. In our interviews, we have secured much information about how young people think of digital media, how they make use of them, and what they see as the advantages and the limitations of the panoply of devices at their fingertips.
INTRODUCTION

To supplement our studies with young people, we have carried out an ambitious, complementary program of research with knowledgeable adults. We constituted seven focus groups, each composed of six to ten adults who had worked with young people over at least a twenty-year period—spanning the predigital to the hyperdigital era. Each focus group assembled adults who had a particular form of contact with young people. Specifically, there were focus groups composed of psychoanalysts; psychologists and other mental health workers; camp directors and longtime counselors; religious leaders; arts educators; and classroom teachers and after-school educators who worked primarily with youth living in low-income neighborhoods. In addition, we carried out forty interviews, many extending over two hours, with high school teachers who had worked with young people over at least two decades. Each focus group and interview was recorded, documented, and analyzed.

Last, in what we believe is a unique line of research, we have compared the artistic productions of young people gathered over a twenty-year period using depositories of student work that had been accumulated continuously throughout the two decades. We chose to look at two bodies of work—student writing and student graphic productions—and discern how the work changed over this period. Our findings, detailed in our discussion of the imaginative powers of young people, revealed the importance of the particular medium of expression chosen by the young artists.

So much for our methods: technical details are provided in the appendix. Another downside of most current discussions of young people is that they are lamentably anachronistic—that is, they lack careful attention to the various contexts within which a discussion of today’s young people needs to be considered.

Accordingly, in the next chapters, we provide two disciplinary contexts within which to locate the young people of today. The first context is technological. If we are to claim that the youth of today are defined by the technologies they favor, we need to consider how, in earlier times, technologies—ranging from hand tools to telephones—may have affected or even defined human beings, human nature, and human consciousness. This discussion invites us to distinguish among tools, machines, and the information-rich media of the past century and to consider how digital media may represent a quantum leap in power and influence.

The second context is deliberately interdisciplinary. We ask, “What do we mean when we speak of a generation?” For most of human history, generations have been defined biologically—the time from an individual’s birth to when that individual becomes (or could become) a parent. In recent centuries, generations have been increasingly defined by sociological considerations. The defining characteristics of a generation echo the dominant events of the time, be they military (the Great War), political (the assassination of a leader), economic (the Great Depression), or cultural (the Lost Generation of the 1920s, the Beat Generation of the 1950s). We propose that, going forward, generations may be defined by their dominant
technologies, with the length of the generation dependent on the longevity of a particular technological innovation.

Throughout our discussion, we keep our eyes on how young people have acted—as well as how they have been characterized and defined by their elders. At the same time, we maintain a sharp focus on the events of the past half century—specifically, the events that defined the spaces in which Howard, Katie, and Molly have each grown up and have helped to fashion the identity, intimacy, and imagination of the three of us, and of our peer groups. As it happens, two books published in 1950—The Lonely Crowd, by the sociologist David Riesman and his colleagues, and Childhood and Society, by the psychoanalyst Erik Erikson—provide apt contexts for this transgenerational comparison.

In such a wide-ranging undertaking, with both empirical variety and disciplinary reach, we (as well as our readers) welcome a viable and dependable throughline. This throughline is provided by our characterization of today’s young people as the App Generation. Whether we are unpacking the technological or generational contexts, or reviewing our various empirical studies, we focus on how the availability, proliferation, and power of apps mark the young persons of our time as different and special—indeed, how their consciousness is formed by immersion in a sea of apps. Fittingly, in the concluding chapter, we consider the effect of an “app milieu” on a range of human activities and aspirations. More grandly, we ponder the questions, “What might life in an ‘app world’ signal for the future of the species and the planet?”

The first technologies are built into our species’ hardware and software. Stroke the side of a newborn’s foot and the toes will spread; make a sudden loud sound and the infant will startle; smile at a three-month-old and the baby will smile back. No instruction is necessary.

Externally invented technologies have been with us for many thousands of years, and they are equally a part of human development. One can tickle with a brush as well as with the hand; the loud sound can come from a percussion instrument or a foghorn; and the infant can smile at a doll or a mobile. Nor need the young child be a passive reactor. Within the first year or so of life, the child can shake a rattle, search for a hidden phone, even drag a computer mouse and behold an object skipping across a screen ... or, in the manner of the only slightly fanciful cartoon reproduced here, transfer funds from one account to another.

Whether part of each of our bodies, or devised by human
Acts (and Apps) of Imagination among Today’s Youth

Apps like SketchBook, Brushes, ArtStudio, Procreate, and ArtRage allow artists to draw, sketch, and paint using their smartphone or tablet. Photographers can create and manipulate images with Flixel, Instagram, Fotor, and PhotoSlice. For aspiring filmmakers, there’s Viddy, iMovie, Video Star, and Movie360. Musicians can compose and arrange their music using SoundBrush, GarageBand, Songwriter’s Pad, and Master Piano.

We could make similar lists for just about any artistic genre. A sizable portion of the app ecology is devoted to supporting artistic production. Even apps that aren’t ostensibly meant for creative pursuits lend themselves to imaginative uses. Recall our earlier discussion of the mini-performances that Molly stages and sends to Katie via the messaging app Snapchat. Living up to the name that we have bestowed on them, apps have changed how members of the App Generation engage their imaginations. We’ll explore what’s gained and what’s lost by using apps (and other digital media) for the purpose of artistic expression.

We find that digital media open up new avenues for youth to express themselves creatively. Remix, collage, video production, and music composition—to name just a few popular artistic genres of the day—are easier and cheaper for today’s youth to pursue than were their predigital counterparts. It’s also easier to find an audience for one’s creative productions. The app metaphor serves us well here, since apps are easy to use, support diverse artistic genres, and encourage sharing among their users.

And yet—reflecting patterns we observed in youth’s expressions of personal identity and experiences of intimacy—an app mentality can lead to an unwillingness to stretch beyond the functionality of the software and the packaged sources of inspiration that come with a Google search. We ask: Under what circumstances do apps enable imaginative expression? Under what circumstances do they foster a dependent or narrow-minded approach to creation?

Before proceeding, two background points. First, a word about our focus on art. We recognize that the imagination can be exercised in just about any sphere, be it science, business, a hobby, or sports. Indeed, Erik Erikson was referring to a wide range of endeavors when he wrote about the challenge of using one’s mind and one’s resources actively and imaginatively to pursue a meaningful, generative life. We focus on art because it may have the broadest provenance, because it’s generally what people think of first when they think of imagi-
nation, and because we have had the opportunity to examine wonderfully revealing collections of art secured over a two-decade span.

Second, a word about the term imagination. We are interested in how young persons use their cognitive, social, and emotional capacities to broaden their understandings and enrich their productions—to think outside the box, as the saying goes. Many commentators are interested in this twenty-first-century skill, and they readily invoke words like “creativity,” “innovation,” “originality,” and “entrepreneurship” to capture the idea. We like “imagination” because it focuses sharply on the psychological process that the young person can bring to an activity—and, to be candid, because it allows us to speak of the Three Is.

FROM VIDEOTAPE TO VIDDING

There can be little doubt that apps and other digital media technologies have altered the landscape of imaginative expression. They’ve affected virtually every facet of the creative process, encompassing who can be a creator, what can be created, and how creations come into being and find an audience.

Let’s consider a few examples. If you’ve watched the Super Bowl (or, more important, the commercials) at some point over the past several years, you’ve likely seen one or more of the consumer-generated ads for Doritos. PepsiCo Frito-Lay, the company that sells Doritos, initiated the “Crash the Super Bowl” advertising campaign in 2007 by inviting fans to design their own thirty-second ads for Doritos and to vote online for their favorite finalists. After submitting their projects, many of the amateur filmmakers used social media platforms like YouTube and Facebook to build support for their commercials.

For the 2012 Super Bowl, submissions topped 6,100 (the highest ever) and online voting reached into the hundreds of thousands. One of the competition winners—featuring a baby and grandmother duo who team up to snatch a bag of Doritos from a playground bully—scored the no. 1 spot on the USA Today/Facebook Super Bowl Ad Meter. The Ad Meter itself marked the first time that USA Today partnered with Facebook to allow viewers—rather than preselected, “authorized” panelists—to choose their favorite Super Bowl commercial. The Ad Meter win earned the ad’s creator, a former special education teacher, a bonus prize of one million dollars from PepsiCo.

To be sure, the “Crash the Super Bowl” campaign is partly a story about how corporations are finding ways to use social media to grow their profits. But it also illustrates how today’s digital media technologies are shaping the creative process in new ways. The introduction of inexpensive and flexible video-taking hardware (smartphones, digital cameras, tablets) and video-editing software (many of them available as apps like iMovie, Viddy, and Movie360) has both lowered the bar for entry into filmmaking and elevated the quality of amateur productions. The advent of social media is also transformative. Scholars talk about the important role that “the
field” — essentially, those who judge any given work — plays in the creative process. Video-sharing sites and apps like YouTube, Vimeo, and Facebook have dramatically expanded the size of this field, as well as the amateur videographer’s access to it.

Molly is one such amateur videographer who’s taking advantage of the creative opportunities introduced by digital media technologies. She started making videos at age eleven with the iMovie software that came standard with her first laptop, a MacBook. She found the software intuitive and enjoyed tinkering with the various effects, title sequences, and music overlays. Her movies have typically involved clips of time spent with friends and family, artfully pieced together and set to evocative music. She’s even posted a few on YouTube. “While they get nowhere near the millions of views that a Justin Bieber video gets, it’s nice to think my teeny videos have been watched by other people.”

We’ve interviewed several other young creators during our research and found them to be using digital tools in a variety of imaginative ways. Nineteen-year-old Danielle told Katie about her experiences creating and sharing vids on the online journaling community LiveJournal. The young videographer described vids as short videos consisting of clips from a television show or movie and set to popular music. As such, they belong to the same family as musical mashups, made popular by the TV show Glee. Typically, there’s a strong fan community surrounding the chosen television show or movie. Viewers are expected to draw on their background knowledge of the original work to interpret the message conveyed by the vidder’s scene and music selections.

The majority of Danielle’s vids feature scenes from the sci-fi television series Stargate Atlantis, though more recent vids draw from movies. In addition to expressing her imagination, Danielle uses her vids to convey political messages, typically of a feminist bent.

The vidding community that Danielle belongs to on LiveJournal represents an important part of her vidding experience. There, she learns technical skills from more seasoned vidders, receives constructive feedback on the work she shares, and offers her own feedback on others’ work. This community isn’t limited to the virtual world. Days after her first interview, Danielle flew to Chicago with her best friend to attend a vidding conference where she was excited to meet some of the more “famous” vidders who have mentored her on LiveJournal.

A variety of other social media platforms besides LiveJournal — many of which are available in app form — give youth the opportunity to share their creative work with others. Figment is a “social network for young-adult fiction” — in the words of cofounder Jacob Lewis, a former managing editor of the New Yorker — where teens can share their creative writing with other teen authors. Like other social network sites, teens create a profile page that includes a profile picture, a self-description, a list of followers, group memberships (such as “The Poets of Figment” and “Queer Figs”), and a wall for other users to write comments. Given the literary
focus of the site, profile pages also include a list of favorite authors, links to the profile owner's original writings as well as reviews about other writings, and the array of badges that the teen has earned from his or her participation on the site. (A few examples: the "Wordsmith" badge, awarded when a teen has posted ten original pieces; the "Bookworm" badge, awarded when a teen has read twenty-five writings by other teens; and the "Critic" badge, awarded when a teen has written thirty reviews). DeviantART, another site with a similar setup, focuses on visual art instead of creative writing. Sites like these open up exciting possibilities for youth creators to share and receive feedback on their work.

There's much to be excited about in these examples of creative expression in the digital era. Scrolling through the writing and art on sites like Figment and deviantART, it's clear that many young people are using these digital tools to exercise their imaginations. And yet, one wonders what sort of exercise they're getting with these tools. Take Danielle's vids as a case in point. There are certainly those who celebrate vidding and other forms of remixing as original and creative acts of artistic expression. Others, however, argue that there's nothing original about reusing work created by others. Of course, this argument existed before the arrival of digital media technologies—think of Marcel Duchamp's toilet "fountain" or Andy Warhol's soup cans. The argument is simply brought into sharper relief in this copy-and-paste culture.

There's also a question of whether the constraints built into apps and other computer software adversely restrict the creative process. Thinking back to our opening example of young children being introduced to a new toy, we raise the question of whether children are better off making up their own games in the backyard or playing video games designed by professional game designers. Even when media aren't part of the creative act itself, one wonders how young people's steady diet of text messages, Facebook updates, tweets, and streaming music affects their ability to engage deeply in the creative process and, sooner or later, strike out on their own.

**IMAGINING, THEN AND NOW**

Before we consider how apps and other digital media affect imagination, let's first explore whether young people's imaginative processes have actually changed since the introduction of new media technologies. Imagination is a difficult concept to define, let alone measure. Nonetheless, psychometricians have given it their best effort, typically by administering various tests of creativity. Perhaps the most widely used creativity test is the Torrance Test of Creative Thinking (TTCT). Developed in 1966 and currently used worldwide, the TTCT measures several dimensions of creative potential, including intellectual curiosity, open-mindedness, verbal expressiveness, and originality. Though not without its critics, the TTCT has been found to predict creative achievement better than other standard measures of creative or divergent thinking.
cal evidence suggests that high scores on the test successfully predict subsequent creative careers and accomplishments.\

In a widely publicized study, Torrance scores from approximately three hundred thousand children and adults were used to investigate whether the creativity of Americans has changed over the preceding twenty years. The research documents a pronounced decline in scores across all areas of the figural test. The largest drop was seen in scores on elaboration, which includes the ability to elaborate on ideas and engage in detailed and reflective thinking, as well as the motivation to be creative. Declines were also found in fluency (the ability to generate many ideas), originality (the ability to produce infrequent, unique, and unusual ideas), creative strengths (which include emotional and verbal expressiveness, humorlessness, unconventionality, and liveliness and passion), and resistance to premature closure (the inclination to remain open-minded, intellectually curious, and open to new experiences). Overall, the declines were steepest in more recent years, from 1998 to 2008, and the scores of young children—from kindergarten through sixth grade—decreased more than those of other age groups.

Curiously, in the same issue of the journal in which this study was published, another group of researchers published an article whose findings paint a more optimistic picture of changes in youth creativity. The researchers analyzed results from fourteen studies conducted between 1985 and 2008. Each study used the same instrument—the Affect in Play Scale (APS)—to measure the pretend play of children in grades one through three. The APS measures multiple dimensions of pretend play, including imagination (How many fantasy elements and novel ideas does the child produce?), comfort (How comfortable is the child engaging in play, and how much enjoyment does he or she experience?), organization (What is the quality and complexity of the play plot?), frequency and variety of affect (How often does the child express emotion, and what is the range of emotions expressed?), and positive and negative affect (How often does the child express positive and negative emotions?).

Of the seven play dimensions measured, only imagination, comfort, and negative affect showed any significant change over the twenty-three-year period. Imagination and comfort both increased significantly, suggesting that young children have become more imaginative in their pretend play and have come to derive greater enjoyment from play. In contrast, negative affect during play decreased over time. This last change is the only finding that accords with the other study showing declines in creativity, since negative emotional themes in children's play have been linked to divergent thinking. At the end of their article, the authors of the play study acknowledge the inconsistency between the main findings of the two stud-
ies, though they offer little in the way of resolution beyond the familiar call for “more research.”

WHAT OUR DATA SAY ABOUT
CHANGES IN CREATIVITY

The third set of research findings we’ll consider involves our own investigation into changes in youth creativity that may have occurred over the past twenty years. Rather than look at scores on tests of creativity or its correlates (like play), we chose to examine the actual creative productions of young people. This approach provides a more naturalistic view into young people’s creative processes. To that end, we conducted an extensive analysis of short stories and visual art created by middle and high school students between 1990 and 2011. (In our methodological appendix we detail how we analyzed these works, including the steps we took to ensure that our classification of each piece was done in a consistent, objective manner.)

It would be appealing if our investigation could decisively resolve the apparent conflict between the two studies discussed above. Unfortunately, such is the nature of research in this minefield-packed area that we’re unable to do so. In fact, our findings actually complicate the story further, but in ways that we consider instructive and revealing.

Part of our investigation involved an extensive analysis of 354 pieces of visual art published over a twenty-year period in *Teen Ink*, a national teen literary and art magazine based in Newton, Massachusetts. Our analysis revealed a notable rise in the complexity of artwork published between 1990 and 2011. For example, we analyzed the background of each piece, evaluating how the artist treats the space around and behind the foreground figures and objects. Compared to the early pieces, the backgrounds in the later pieces are more fully rendered. In other words, figures are more likely to be situated in a fully completed context in the later pieces, whereas the objects of the foreground are more likely to be seen floating in blank or partially rendered spaces in the early pieces.

This difference was large: 78 percent of the later pieces were categorized as fully rendered, compared to only 49 percent of the early pieces. As a consequence, one experiences the later pieces as more fully developed and complete than the early pieces.

Another marker of complexity that we examined pertained to the composition, or balance, of each piece. In particular, we looked at the positioning of the figures and objects in the visual plane: Are they in the center or off to one side? The number of centrally composed pieces dropped from 58 percent of the early pieces to 49 percent of the later pieces, suggesting that the contemporary artists are somewhat more likely to experiment with the location of their figures on the visual plane.

We also looked for evidence of cropping: Do the figures extend beyond the visual plane? Here we found a rise in the number of cropped pieces, from just 4 percent of the early pieces to 15 percent of the later pieces. Again, the contempo-
rare artists appear to be more comfortable presenting their figures in a less conventional way than the earlier artists.

This departure from convention is also represented by our analysis of the production practices employed by the artist. Not surprisingly, the number of pieces that were manipulated through digital means (Photoshop, postproduction photography manipulation, and so on) increased markedly over the twenty-year period. Less than 1 percent of the early pieces display evidence of digital manipulation; that percentage increased to 10 percent for the later pieces. The later pieces also depart from traditional production practices with respect to the range of media represented. For instance, the number of pieces that employed either traditional pen and ink or another form of drawing (for example, charcoal or pencil) declined from 55 percent of the early pieces to 18 percent of the later pieces. Conversely, the number of pieces using less traditional media—such as digital art, collage, public art, found objects, and mixed media—rose from less than 1 percent of the early pieces to 9 percent of the later pieces.

Our final evidence for the increasing complexity of teen artwork concerns the overall stylistic approach that the artist employed. Examining the pieces holistically in terms of both content and technique, we classified each one as falling into one of three categories: conservative, neutral, or unconventional. We classified a piece as conservative if it followed the traditional conventions of its medium in an appropriate way and didn’t deviate from conventional practices in either technique or content. We classified a piece neutral if it neither followed traditional art genres/styles nor offered a unique or provocative take on its subject. If the piece demonstrated obvious provocation in either content or technique, we classified it as unconventional. Technically unconventional pieces might play with perspective or use media in unusual ways. Work considered to have unconventional content might depict figures in unlikely contexts—bodies climbing out of trash cans, abstract forms made up of screaming, disembodied heads. Sometimes a piece was considered unconventional in both content and technique, sometimes just one or the other. Our analysis revealed that the percentage of conservative pieces declined from 33 percent of the early pieces to 19 percent of the later pieces, whereas the number of unconventional pieces rose from 19 percent to 28 percent.

This departure from the expected suggests a growing sophistication in the art produced by young artists over the twenty-year period of our investigation.

Our analysis of teens’ creative writing—both among middle school students and high school students—produced a notably different pattern of changes. For instance, when evaluating the types of genre employed by the high school writers (for example, science fiction, fairy tale, or historical fiction), we found evidence of a decline in what we call “genre play.” A story was deemed to display genre play when it deviated from a traditional realist perspective, typically by incorporating fantasy elements such as magic or absurdist themes. Among the stories written in the early 1990s, 64 percent incorporate such fantasy elements. By contrast, nearly three-quarters of the
later stories (72 percent) evidence no sign of genre play at all (for sample stories from each time period, see pages 136–139).

We found a similar, though slightly less pronounced, trend in our analysis of middle school fiction. Although we categorized the majority of the pieces in both sets as realism, about one third (32 percent) of the early pieces exhibit genre play whereas, in the later set, only one tenth (10 percent) of the pieces contain any elements of genres other than realism.

A more notable distinction emerged when we looked at the plot of each middle school story. For this analysis, we noted whether the plot was meandering or fast-paced; examined the central conflict of the story; and documented significant moments of rising action. From this analysis, we identified three dominant categories of plot: every day, every day with a twist, and not every day. Every day stories have fairly mundane plots; they tend to describe events at home and at school that could take place on any day, at any time of the year. We defined every day with a twist as a plot that is mostly familiar or mundane but that contains at least one moment of rising action that could not happen every day. Not every day plots contain significant fantastical elements and/or impossible occurrences. We found that the same number of stories in both early and later sets was classified as every day with a twist (27 percent in each set). However, there was a marked shift between early and later stories away from not every day stories toward every day stories. Nearly two-thirds of the early stories (64 percent) were classified as not every day, whereas only 14 percent of the later stories were so classified.

Similar patterns emerged when we examined other story elements like setting, time period, and narrative linearity. For instance, in the high school data set, the early stories are more likely to follow a nonlinear story arc; the later stories tend to unfold in a conventionally linear manner. Whereas only 40 percent of the early stories were classified as linear, fully 64 percent of the later stories were so categorized.

Among the middle school stories, we found that the early stories were more likely to be set in an unfamiliar (at least to a middle school student) location, such as a World War II battle. Whereas almost a third (32 percent) of the early stories took place in distant locales, only one of the later stories (5 percent) involved an unfamiliar setting. Paralleling this trend, we also found that the time period of the early stories was more likely than the later stories to be different from the time period in which the story was composed.

Considered together, these changes in genre, plot, story arc, setting, and time period suggest that, while teens’ visual art has become less conventional over time, creative writing emanating from this age group has become more so.

One last noteworthy change that we identified in the high school stories concerns the formality of the language employed by authors. Compared to the early stories, the language in the later stories is considerably less formal. The contemporary authors are more likely than their counterparts from the early 1990s to incorporate expletives (“piss,” “shit”), slang (“awesomeness”), and made-up words (“glompy,” “smushed”) into their prose. The difference is dramatic. Only 24 percent
of the early stories include informal, pedestrian language, whereas fully 80 percent of the later stories do so. In short, the early stories may be more “out there” in terms of their incorporation of magical and absurdist themes, but the language they use to depict these fantasy worlds is somewhat less flavorful.

This high school story, from the early 1990s, includes fantasy elements, artful word choice, a range of references, and figures of speech.

*The Psychiatrist*

Now I must see my psychiatrist, Dr. Sanborne. How I hate these weekly visits! The notion that anything is wrong with me is absurd, of course. These visits merely erode my checkbook.

As I step into his office, Sanborne scuttles sideways out from under his mahogany desk to greet me, as usual. His blue shell, encrusted with tiny jewels, sparkles, and his fragile feelers begin tracing an invisible diagnosis in the air.

“Good morning! How are you feeling? I think we are making great progress in our sessions. Please sit down,” he says, in a voice like sand being sifted.

“I am perfectly fine.” I lie down on the leather patients’ couch reluctantly. From my vantage point I can see only his eyes, two hypnotist’s orbs, waving on their stalks. I decide this is the last session I will attend. After a pause I blurt out, “Look, Doctor, this is useless. You know my mind is as round and perfect as a seashell.”

His pincers are clicking rapidly, like a machine analyzing my responses.

“You forget,” Sanborne replies, “that there is always an opening through which I can crawl into the hopelessspiral of your subconscious.” He climbs onto the couch. “Listen, do you not hear the rustling ocean of insanity, splashing on the walls of this very room?” He is very sly, but I will not let him trick me this time.

“Nonsense! You are the ridiculous one. You’re not even a man, just a crafty old crab, greedily snatching my money and scurrying off to line your burrow with it,” I shout, pulling a pair of redhandled tongs from my coat pocket with an exaggerated flourish. “I’ve got you now, though.” I firmly grasp Sanborne by his middle, and avoiding his furious pincers, thrust him into my briefcase. “Tonight I dine on boiled crab!”

As I walk out, Sanborne shrieks out from the dark depths at my side: “Release me! You don’t understand the torment of the psychiatrist’s existence: like a doomed Proteus, I am helplessly transformed by every madman’s delusion!”

Dolsy Smith

This high school story, from the late 2000s, features ordinary language, mundane subject matter, and an easily recognizable descriptive genre.
At home every day, it becomes difficult to not just lounge on the couch and smoke cigars while your wife is not home. It becomes difficult to not watch football game after football game and not change the same white shirt that hides your stomach which protrudes over a pair of pajama pants that you have owned for years. However, the-used-to-be loose elastic band now has tightened. You pull at it periodically to measure the amount of fat you could possibly gain before needing new pants. You are disappointed every time because it always ends up being less than an inch. Luckily, your wife has also left a post-it note on the bathroom mirror with the scribble, “Don’t forget to walk the dog, do the dishes, and take the trash out. Making fish for dinner, smiley face, love you!” You are considered an old man now, dressed in a business suit each day, even though you are only going to the store, to the barber, to tend to matters regarding your dying mother. This is the first year of your adulthood that you have not spent working. Your wife wakes up next to you at six in the morning, seven days a week. Your daughter and son no longer call daily but rather, you receive a text message every other day on a phone with a touch screen that you’re not sure how to end a call on. The messages relay pictures of the grandchildren in Ralph Lauren, Armani Baby, and Jotum. You worked hard to raise the children well, they married wealthy companions that they may or may not love, and the grandchildren are spoiled, just not like the grilled cheese sandwich you found in the refrigerator last week. No longer within miles of you, your family has become extended, but you hold your hand to your heart before you go to bed every night and say, “Thank you. Thank you. Thank you.”

WHAT TEACHERS SAY

To complicate matters further, we also spoke with art teachers (visual art, music, and performing arts) who’d been teaching for at least twenty years and therefore could reflect on changes they’ve observed in students’ imaginative processes over time. Though these teachers celebrated the broad range of creative opportunities now open to today’s youth (which we discuss in greater detail below), several arts educators observed that today’s students have more difficulty in coming up with their own ideas; they’re far more comfortable engaging with existing ones. One participant reflected: “Some of the most artistically skilled kids cannot come up with an idea. They’ve got full scholarships to Mass Art [Massachusetts College of Art and Design] and they can’t come up with an idea. . . . They go to their laptop first. . . . I find that I’m constantly shoulder to shoulder asking what do you see? What does it mean? . . . They’re thinking too much or saying ‘I have
nothing.’” Moreover, when they do come up with their own ideas, they often have difficulty executing them, particularly in the absence of clear “executive assistants.” Said another participant, “Before, they used to jump in and see where the materials would take them, now they ask what to do.”

The camp directors made a similar point when they reflected on the changes they’ve seen in skit night, a camping tradition in which campers form groups and perform a short skit for the rest of the camp. Today’s campers are more likely to re-create an episode from a favorite TV show than they are to invent their own story, as campers did in years past. The recreations may be more polished, but the invented stories were more interesting (and more promising) for being original. These observations from the art teachers and camp directors align with the overarching concern expressed by our many informants drawn from different sectors: youth of today display less willingness to take risks in their creative productions.

One of the theater directors told us that both students and student productions are more conservative today. Twenty-seven years ago, his students produced a “very edgy” version of Alice in Wonderland that featured a surrealistic set and unorthodox lighting. This year, his students produced the same show using the same script. The more recent version of the show was “cute and sweet,” the director lamented, and the students, while talented, did not discern the piece’s more subtle political messaging. Today’s students are also concerned about potentially “getting into trouble” for mounting productions that might be construed as “provocative.” It was not clear with whom the students might “get into trouble”—parents, administrators, peers, or another group of concerned individuals. Lamented one participant, “[They’re] rule followers to a fault.” These findings echo the search for “correct answers” and “documented procedures” and precise scoring rubrics that Howard has noted among his students in recent years.

**REMXING THE IMAGINATION FOR A DIGITAL ERA**

Our participants pointed to the Internet’s vast supply of packaged sources of inspiration to explain why today’s young people have greater difficulty coming up with their own creative ideas and instead prefer to engage with existing ones. After all, it’s easier to reach for Google instead of scouring one’s imagination for a new idea. One participant reflected: “The classic example is ‘Go outside on a snow day.’ How many kids are actually outside making a snowman or having a snowball fight? Not many. They’re inside creating a snowman on the computer.” Still, one could argue that if the end result is judged to be a creative piece of work, who cares where the source of inspiration came from? Surely one can engage with existing ideas in a creative way.

The trouble is, there’s considerable debate over the value of what youth create with these existing ideas. While many respected authorities celebrate remix culture, others are less san-
In his book *You Are Not a Gadget*, computer scientist and cultural critic Jaron Lanier bemoans the effects of remix on individual creativity: “Pop culture has entered into a nostalgic malaise. Online culture is dominated by trivial mashups of the culture that existed before the onset of mashups, and by fandom responding to the dwindling outposts of centralized mass media. It is a culture of reaction without action.”

Even if a person made a concerted effort to act instead of react, to invent instead of remix, Lanier argues that digital media would still throw up obstacles to creativity. He uses the expression “lock-in” to describe the limited range of actions and experiences open to users when they interact with computer software. As a result of a programmer’s (often arbitrary) design decisions, certain actions are possible—indeed, encouraged—while others don’t even present themselves as options.

Lanier’s primary example of lock-in involves MIDI, a music software program developed in the 1980s to allow musicians to represent musical notes digitally. Because its designer took the keyboard as his model, MIDI’s representation of musical notes doesn’t encompass the textures found in other instruments, such as the cello, flute, or human voice. Lanier argues that something important is lost when one makes explicit and finite an entity that is inherently unfathomable (or, to invoke another lexical contrast, when one seeks to render as digital what is properly seen as analog). Moreover, since MIDI was an early and popular entrant into the music software industry, subsequent software had to follow its representation of musical notes in order to be compatible with it. As a result, the lock-in was reified. MIDI is a good example of how early design decisions can circumscribe subsequent creative acts.

Apps may represent the ultimate lock-in. Consider the Songwriter’s Pad app, a tool for writing songs and poems on an iPad. This app is intended to make songwriting easier by breaking down the process into manageable sections and helping the songwriter to keep track of his or her ideas and progress. It’s also supposed to inspire creativity by supplying built-in sources of inspiration such as a rhyming dictionary and thesaurus. In addition, the app generates words or phrases based on specified moods like anger, desire, love, or hope. For instance, clicking the “anger” button calls up such phrases as “you ripped my heart out” and “stormed off fuming.” Songwriters add the phrases they like to a digital sticky note, then copy and paste a desired phrase directly into their song when they’re ready to use it. Though these features may indeed help to free users from creative blocks, the song that’s written risks resembling a paint-by-number picture. As with a paint-by-number picture, the songs created on Songwriter’s Pad are circumscribed by the choices that the designers made when building the app. There may be more original and appropriate phrases that express anger than “you ripped my heart out” and “stormed off fuming,” but because they’re not part of the app’s database, they have less chance of being thought of and less chance of making it into a song composed on this app.

As the Songwriter’s Pad example illustrates, there’s also less of yourself when you look to apps to supply the grist for your creative acts and encounters. Consider the way many of us
now use our search history as a memory prosthesis. Instead of recalling the insights gleaned from an earlier search, we remember only the search terms we used and rely on them to re-create our intellectual path for us.\textsuperscript{15} Although this practice is certainly useful and may, at its best, lead us to new insights, it has none of \textit{us} in it. There's no opportunity to take a bite of cake at teatime and, like the narrator in Marcel Proust's novel, launch a meandering journey through our own imagination.

We can see algorithmic lock-in at work in studies that investigate the effects of different media on children's ability to produce imaginative responses. In one study, children in grades one through four were separated randomly into two groups and presented with the same fictional story.\textsuperscript{16} One group listened to the story via radio, while the other group watched the story on a television. Afterward, all of the children were asked what they thought would happen next in the story. The researchers rated children's imaginativeness by recording the novel elements (such as characters, setting, dialogue, and feelings) they used in their responses. The children who listened to the radio produced more imaginative responses, whereas the children who watched the television produced more words that repeated the original story. Media scholars have used this study to illustrate the "visualization hypothesis," which posits that children's exposure to ready-made visual images restricts their ability to generate novel images of their own.\textsuperscript{17}

Let's revisit our research team's study of teen artwork and fiction in light of the visualization hypothesis. As our focus group participants noted, ready-made visual images are never more than a mouse click or finger swipe away from today's youth. The Internet provides young people access to a greater quantity and wider range of art than in years past. By comparison, youth's access to the literary medium hasn't changed considerably over the years—in fact, the hegemony of the graphic medium may have displaced it. Indeed, linguistic anthropologist Shirley Brice Heath observes that owing to the increase in visual stimuli provided by television and the Internet, youth today are more likely to say "Did you see?" rather than "Did you hear?" or "Did you read?."\textsuperscript{18} It is likely that today's young artists draw on this store of visual imagery when they create works of art. Seen in this light, the increased complexity and departure from convention that we detected in teens' art may be less about breaking new ground than about skillfully retreading old. With respect to our analysis of teen fiction, the increased conventionality and use of informal language we observed may reflect the pedestrian language of the tweets, texts, and instant messages that form a substantial portion of youth's daily reading. (We also wonder if these shifts have any relation to the fact that in 2013, after adding a supplemental four hundred word essay to its list of required application materials, Boston College saw a 26 percent decrease in applications. If there were only an app for why one should want to go to BC!)\textsuperscript{19} Put succinctly, what seems creative on the surface may actually be re-creative.

In addition to constraining youth's creativity, digital media may also disrupt the mental processes conducive to creative
thought. Individuals generate new ideas by reflecting on the world that surrounds them. Reflection requires attention and time (counterintuitive as it may initially seem, boredom has long been a powerful stimulator of the imagination), two things that are hard to come by in today’s media-saturated world. Consider the simple act of walking the dog. Before cell phones, it was just you and the dog. In its singular focus, this daily routine (for some, considered a chore) afforded plenty of room for the mind to wander and maybe even stumble on a creative thought. Now, it’s just another opportunity to multitask.

In a briefing paper published by the Dana Foundation, cognitive neuroscientist Jordan Grafman expressed the following concerns about our constant state of divided attention: “I think that one of the big trade-offs between multitasking and ‘unitasking,’ as I call it, is that in multitasking, the opportunity for deeper thinking, for deliberation, or for abstract thinking is much more limited. You have to rely more on surface-level information, and that is not a good recipe for creativity or invention.” In support of this claim, there is evidence that individuals who engaged in multitasking displayed cognitive processing that was less flexible and more automatic than subjects who engaged in a single task.

It bears mentioning that breaks in attention can sometimes be good for the creative process, particularly when the goal is to arrive at a sudden insight, or eureka moment. According to the incubation effect, time away from a task enables individuals to restore their cognitive resources, gain new perspectives, and avoid impasses. Still, research suggests that it’s best when those breaks are chosen by the individual rather than imposed externally in the form of scheduled interruptions. To be sure, today’s media landscape provides ample opportunities for self-selected breaks (provided we don’t become so absorbed in reading Facebook updates or watching YouTube videos that we abandon our task completely). But this ubiquitous surround also brings frequent interruptions in the form of pinging emails and buzzing phones—or, should these interruptions fail to materialize, even anxiety.

**BEYOND APPS**

It would be myopic to look at digital media’s impact on young people’s time and attention without also considering important changes to other aspects of their lives. Indeed, our focus group participants expressed regret that certain changes to the educational environment prevent youth from pursuing their creative interests. In school, arts programming has been sidelined or even eliminated as administrators place test preparation at the center of the curriculum and the heart of the day. One educator bemoaned, “Many of the vehicles that [students] used to be able to express themselves creatively are now gone—theater, arts . . . different electives.” This sideling is most pronounced in struggling schools that typically serve underprivileged youth. At the time of our study, these schools faced the threat of closure if a sufficient percentage of
their students failed to meet mandated annual yearly progress goals.

While affluent youth may benefit from greater opportunities for art while in school, participants noted that the regimented quality of their extracurricular activities leaves little room for them to exercise their imaginations outside school. There is little of the precious “time to waste” in youth that is nostalgically recalled by many highly creative artists and scientists. Extracurricular activities have become résumé-building opportunities; students try to distinguish themselves in increasingly impressive ways in the hope of gaining admission to a selective college and, thereafter, to a prestigious internship or job placement. Even the camp experience has been affected, as camp directors feel pressure from parents to provide a documented “value-added” summer experience for their children. As a result, camp has become increasingly structured, the activities more goal-directed. It’s hard for imagination to take root, let alone sprout buds, in such arid soil. Indeed, scholars have found that participation in highly structured activities undermines problem finding and creativity.

And what of the workplace? Companies like Google, Facebook, and IDEO claim to value, nurture, and reward creativity in their employees. They go out of their way to create an environment conducive to imaginative thought: innovative office layouts, flexible work schedules—Exhibit A: Google’s famous fifth day to pursue a project of one’s own design. Such practices would appear to stand in stark contrast to the educational experiences and risk-averse orientations of today’s young people. There are two reasons why it does not. Google, Facebook, and IDEO have quite distinct notions of what counts as a good or bad answer to their puzzles. More important, theirs is sanctioned risk-taking. Employees are told, “Here is a context in which you should take risks.” And, of course, then it is no longer a risk. That said, these programs and recruiter techniques do call for certain creative qualities of mind—ones now described in books that let you figure out whether you “are smart enough to work at Google.” They are biased against people who are not good at playing that kind of game—or employing that kind of “app.”

**WHEN APPS ENHANCE**

Although the arguments and evidence presented above concern us, our investigations also give us reason to be optimistic about the creative potentials of apps and other forms of digital media. At the beginning of this chapter, we shared examples of young people—including Molly—using digital media in imaginative ways. These examples illustrate aspects of new media technologies that impress our focus group participants: the lowered bar for entry into creative pursuits, the increased sophistication of what youth can create, and the wider variety of creative opportunities now open to young people. One educator working in a low-income neighborhood reflected: “I would say technology helps. . . . It allows a lot of teens to be creative who wouldn’t otherwise: music, robotics, music pro-
duction.” In the words of Seymour Papert, founding member of the MIT Media Lab, and his colleague, Mitch Resnick, head of the Lifelong Kindergarten group at MIT Media Lab, new technologies lower the floor, raise the ceiling, and widen the walls for youth creators.  

Beyond expanding opportunities for creation, there’s evidence that certain media activities can enhance individuals’ creativity. In one study, researchers investigated the relationship between middle school students’ scores on the Torrance Test of Creative Thinking and four types of information technology: computer use, Internet use, video game playing, and cell phone use. The investigators found that all six types of video game playing (including action-adventure, racing/driving, and violent video games) were positively related to creativity. In other words, students who played more video games were more likely to score higher on the TTCT. The researchers found no relationship between students’ creativity scores and the amount of time they spent using a computer, the Internet, or their cell phone.  

Had the researchers looked at students’ specific uses of these technologies, they might have found that certain activities do, in fact, support creativity. That’s what researchers in Pamplona, Spain, discovered when they investigated two digital tools designed to stimulate university students' generation of ideas and originality. The first, called Wikideas, uses wiki technology to facilitate the brainstorming process, from generating new ideas to assessing their value. Creativity Connector, the second tool, is a social networking platform that works in conjunction with Wikideas to connect participants and support their collaboration. Study participants were software engineering students enrolled in a project-based learning course. They were instructed to use Wikideas and Creativity Connector to complete a team-based software development project. The researchers found that the tools had a positive effect on the number and originality of students’ ideas. The tools also promoted productive, successful collaborations among team members.  

In this example, two features of the digital tools are worth noting: support and collaboration. One of the biggest challenges in the creative process is simply getting started. Wikideas helps students overcome this nontrivial challenge by giving them support in the idea-generation phase of creation. Wikideas doesn’t come up with ideas for them, just nudges them in the right direction. In this way, it resembles Songwriter's Pad and other apps that attempt to make creating less overwhelming. As composer Igor Stravinsky famously said: “The more art is controlled, limited, worked over, the more it is free. . . . If everything is permissible to me, the best and the worst; if nothing offers me any resistance, then any effort is inconceivable, and I cannot use anything as a basis, and consequently every undertaking becomes futile.” And yet, the question remains: Where to draw the line between jump-starting inspiration and locking one in to prepackaged ideas?  

As a social networking tool, Creativity Connector is distinguished by its ability to connect people virtually and support
their creative collaboration. We’ve already encountered other social networking platforms that perform a similar function, such as Figment, deviantART, and LiveJournal. In his book *Cognitive Surplus*, Clay Shirky celebrates digital media’s ability to connect people easily, quickly, and cheaply. Drawing on examples like the Impressionist painters, who lived and worked together in southern France, Shirky argues that collaboration is a central component of creativity. Where collaboration is supported and encouraged—as it surely is online—creativity will thrive.

**TA K I N G S T O C K**

Just as apps provide new forms of self-exploration and new methods for connecting to other people, they also furnish new means for exercising the imagination. Photo apps allow users to manipulate images in various ways, such as altering color, perspective, and focus. Music apps turn smartphones and tablets into miniature recording studios, while painting apps transform them into easels. Barriers of time, money, and skill are low, expanding which persons can call themselves creators and what they may be able to create. As we’ve discussed in this chapter, however, the act of creation is circumscribed by the app’s underlying code and the developer who wrote it; to paraphrase Lawrence Lessig, the code determines the creation. A specific hue of green may not be included in one’s painting app; the piccolo might be missing from the music app. Users have little choice but to work within these limitations. The avenues to artistic expression may be many in the app era, but they’re often tightly bounded.

Creativity scholars sometimes talk about “Big C” and “little c” creativity. The former consists of the truly ground-breaking, original works of art that can change a domain permanently: Stravinsky’s *Rite of Spring*, Pablo Picasso’s *Desmoiselles d’Avignon*, Martha Graham’s *Frontier*. By contrast, “little c” creativity inheres in the realm of daily problem-solving and adaptation to change. Our investigations lead us to conjecture that digital media give rise to—and allow more people to engage in—a “middle c” creativity that is more interesting and impressive than “little c” but—due to built-in software constraints and obstacles to deep engagement—decidedly less ground-breaking than “Big C.” These studies also suggest that digital media may have a freeing effect on those young people who already have a disposition to experiment, to imagine, while having a freezing impact on that increasing proportion of youth who would rather follow the line of least resistance.

As we saw in our considerations of identity and intimacy, the digital media do not (at least yet) fully determine how young people think and act. In each case, one can describe scenarios in which the App Generation lapses into a comfortable state of app dependence, as well as a happier scenario in which apps enable youth to have a deeper and more rounded sense of self as well as more fully developed intimate relations with others. With respect to artistic activities, the picture turns out to be even more complex. In the spirit of Marshall McLuhan,
we’ve described how imagination with respect to one medium (graphic expression) is more likely to be enhanced than imagination with respect to another medium (literary expression). When it comes to the matter of creativity, the medium matters. We’ve noted as well that imagination is likely to be facilitated by the greater ease of communication with others, far as well as near, and by the often powerful vocational and cultural signals in the surrounding community. In our final pages we ponder how these complex factors may be changing the fundamental nature of human society and human consciousness.

"Civilization advances by extending the number of important operations which we can perform without thinking about them."
—Alfred North Whitehead

UTOPIAS, DYSTOPIAS

The British writer Anthony Burgess is probably best known for his 1962 novel A Clockwork Orange, adapted a decade later (1971) into a memorable movie by director Stanley Kubrick—a work that has in the years since morphed into a cult classic. Briefly, the novel portrays a young ruffian, Alex, who participates all too eagerly in mayhem, rape, and even murder. As Burgess puts it, Alex is generously “endowed, perhaps over-endowed, with three characteristics that we regard as essential attributes of man.” To specify: Alex is very articulate; he loves beauty, especially the music of Beethoven; and he revels in violence, specializing in terrorizing urban streets at night.