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Multiple Worlds: Adolescents, New Digital Media, and Shifts in Habits of Mind  
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## SUMMARY

Today's youth are the first generation to have lived their entire lives in a world rich with new digital media (NDM). NDM are ripe with the potential to transform young people's experiences, for better and/or for worse. Have these tools prompted changes in the ways young people think and act? This question has informed the research of the Developing Minds and Digital Media project. Our data, collected from forty excellent and experienced educators practicing at secondary schools in the Boston area, paint both an in-depth picture of the typical upper middle class high school student and contextualize this information with respect to earlier generations of students. Our research controlled for socioeconomic factors, with a focus on the children of more privileged households.

We made a number of key observations regarding identity, cognition, and social cognition that point to novel developments related directly to NDM use. These observations share a sense of multiplicity. Practices that had been previously firmly situated in the construction of an isolated individual are now, via NDM, distributed, divided or fractured. The once unitary individual can now slip personae on and off with ease, as well as assume a new distanced perspective from the self. The student increasingly swims, and sometimes drowns, in a powerful current of fast-moving information. And the roles of son or daughter, student, worker, and friend that the typical adolescent assumes now overlap as NDM allow the user to inhabit multiple roles, and worlds, simultaneously.

### **More breadth, less depth: The limits of multitasking**

Today's adolescents typically spend their time online socializing with friends, skimming the internet for specific answers, or simply playing around. Often, they engage in these practices simultaneously. Educators suggest that while some students are adept at multitasking, many are overwhelmed by the amount and type of information to which they have access. It may also be the case that the sheer amount of information makes it more difficult to convert knowledge into deeper understanding. It is unclear whether the average adolescent has the capacity to learn how to multitask successfully, and whether multitasking stretches cognitive capabilities or merely disrupts them.

### **Seeing the self in the third-person: The self as a rehearsed and constructed entity**

While rehearsing one's identity is not a new practice, NDM allow individuals to engage with others in an asynchronous fashion. In addition, these media allow for a carefully designed and rehearsed persona to be enacted without the risk of direct, real-time feedback or refutations, with IM (instant messaging) and text messages generally reserved for more intimate relationships and exchanges. Face-to-face interactions and the immediacy, spontaneity, and unpredictability associated with them have been augmented by the widespread adoption of more studied communication methods via NDM texting and social networking sites.

### **All together now: The end of 'alone'**

No longer restricted by physical or technological limitations, youth increasingly rely on portable devices coupled with expanding networking capabilities to stay connected with family, friends, and communities of their own choosing around the clock. Similarly, the internet offers a wide range of group chats and collaborative game playing, available on demand. It appears that the students described to us by our cohort of educators are never quite alone, filling stray moments with activities and associations both offline and online. We marvel at the possibilities of an extended "household" or online community one can turn to whenever needed. We wonder both about the limits of tolerance for individual vs. collective reflection, and how a broad reliance on external supports may impact conceptions of the self and relations to others.

## INTRODUCTION

Researchers on The Developing Minds and Digital Media project interviewed forty experienced and articulate high school educators (drawn from sixteen elite New England schools with an average of twenty-three years in the classroom) about what types of changes, if any, they had observed in their students over time. Our team devoted special attention to changes in routine (non-social) cognition, social cognition, and moral and ethical priorities as they relate to new digital media (NDM) engagement.

The project's findings are nuanced and encompass a wide range of behaviors. To capture our conclusions succinctly, we determined that NDM encourage certain tasks and behaviors and discourage others – the archetypal 'mixed blessing.' Much of the tension derives from how students deal with the often overwhelming volume of information and practices of social networking online. Some educators told us that their students were not able to multitask well and struggled to process the stream of sensory input. Others told us that some of their students are uncomfortable *not* multitasking. With respect to social cognitive changes, we heard that some youth utilize NDM to socialize with a broad spectrum of contacts, while others use NDM affordances to provide a buffer from other people. With NDM, students have access to unprecedented tools with the potential to encourage intellectual exploration, to broaden social horizons, to forge connections with global colleagues, and to stock the well of their imaginations. The media can afford users enhanced authority, freedom, and engagement via the relatively safe parameters of a screen interface. But NDM may detrimentally impact how students find and process information and make it easier for bullies to ply their trade. Similarly, while NDM may promote diversity by providing a broader range of information about other places, people and cultures, the media can also allow a user to restrict the intake of information. And NDM play a large, if not exclusive, role in the increased incidence of plagiarized work submitted by high school students.

In Part I of this paper, we discuss multiple environmental factors that impact youth habits. We review how the youth described in this study engage with NDM – to the extent that we were able to ascertain from our data. In Part II, we summarize the changes described to us by our educator participants, with a specific focus on areas where NDM have had a likely impact. The analysis is broken down into three categories: ordinary (routine, nonsocial) cognition, social cognition, and moral and ethical priorities. In Part III, we synthesize the salient takeaways and highlight intriguing directions for this or other efforts in the future.

### Methodology

Our research was informed by a broad question: Have NDM changed the way youth think, and if so, how? We consider NDM an umbrella term which encompasses digital hardware (a computer, a computer screen, a cellphone, a wireless network, etc.), software applications that run on these devices (PhotoShop, JavaScript, Facebook, FireFox, etc.), and the behaviors associated with digital engagement (social networking, texting, writing, etc.). We chose to focus particularly on the habits of adolescents. Current teens have been immersed in some aspect of digital media for most of their lives, most are highly engaged with some aspect of NDM, and they are likely grappling with key developmental issues relating to identity, ego, independence, and ethics.

We broke down the processes of thinking into three distinct domains: a more traditional definition of cognition, processing speed, attention, memory, etc., as expressed through demonstrations of text-based and visual facility); a more socially situated cognition (one's habits of mind as shaping and shaped by relationships with others); and moral and ethical priorities (one's habits of mind around behaviors as shaping and shaped by relationships to the world, and society).

There are numerous ways in which one might explore the issue of how young people are impacted by new technologies. These include qualitative interviews with youth and interviews with youth's parents; laboratory experiments involving carefully constructed environments and a control group with limited NDM exposure; and comparisons of interactions with technologies from some point in the past to now. Each of these methods has their own merits and problems; none of them alone is able adequately to capture the change from pre-digital practices to contemporary ones, or the experiences of a large number of youth.

We elected to construct a longitudinal view of the problem space by talking to forty experienced educators who could report directly observed changes in students and education over time. Participating educators were identified through recommendations as outstanding practitioners through peers, administrators, and other researchers at Project Zero, the longstanding research group at the Harvard Graduate School of Education to which the Developing Minds and Digital Media project belongs.

The vast majority of our educator participants have engaged with adolescents in a classroom setting for a minimum of fifteen years, or since the early days of the "digital revolution." The educators held a collective 939 years of teaching experience, with an average of 23.5 years. The minimum amount of teaching experience was seven years, and the maximum was fifty years. All but two of our educator participants have worked with youth in educational settings since 1992, when the internet first emerged as the accessible graphic interface and public media source we know today. This fifteen-year time frame allows us to focus on changes in youth habits and behaviors related to new digital media while limiting variables to the greatest extent possible. Many of the boarding school educators have served as housemasters as well, and could speak to youth practices outside of the classroom. Their unique position affords these educators a thoughtful vantage point into the lives of adolescents and a historically based understanding of changes in widely held student beliefs and practices over time.

While we enjoyed a reasonable level of gender diversity (24 males and 16 females), our sample was less diverse with respect to ethnicity (African-American, Hispanic, and Asians were underrepresented in our sample with respect to the general population). The educators we spoke with are drawn from a broad range of intellectual disciplines, including history (6), general social studies (1), English and/or English literature (6), foreign language (2), art (5), theatre arts (7), music (5), biology (3), chemistry (1), physics (2), athletics (2), and general education (1). In addition to their academic responsibilities, many of our educators also coach a sport. These educators often spoke separately about students and athletes encountered outside of a classroom setting.

Our educator sample hails from eighteen different schools located in the Greater Boston area, with one exception located in central New Hampshire. In total, we surveyed educators from two middle schools, two colleges, and fifteen high schools. We controlled for socioeconomic factors by focusing on a relatively privileged population, with educators reporting that a significant majority of students come from families with incomes between 100K-150K (29.7%) and 150k-350k (45.9%). In narrowing our focus, we helped to ensure that the students we examined are not barred from participating in NDM activities for economic reasons.

Two interviewers met with each educator for approximately 90 to 120 minutes to administer a qualitative interview and a postsurvey (see Appendices A and B). Thirty-nine of the interviews were recorded with digital recorders. The first portion of the interview focused on capturing general impressions of student change over time. We deliberately chose to ask our subjects first for their impressions of changes in cognition over time, with no specific mention of new digital media. However, these media almost always surfaced early in the course of our interviews. The remainder of the interview focused more specifically on examples of change related to NDM. At the end of the interview, the educator completed the postsurvey, which focused on quantitative measures of student and educator NDM use, institutional

adoption of NDM, and student family income levels. Our postsurvey did not capture which NDM devices and networks were adopted, and in what order. Rather, we captured a broad idea of when schools began to introduce these media into teaching spaces.

In addition to recording the interview, both interviewers took detailed notes of the proceedings. For each interview, the two separate sets of notes were later collated into a single detailed master record and a briefer topsheet which summarized key points of interest. Halfway through the interview process, project staff constructed a matrix grid (Strauss & Corbin, 1998) to organize salient data from each master record and topsheet. Categories were determined by the strength and frequency of a finding and later amended as more data were captured.

While our study captures broad contours of youth behavior related to NDM, it is not designed to capture the content of these behaviors per se. We do not address what material youth are accessing online or what video games they are playing, only that they engage in their practices across a variety of contexts. One educator, for instance, says that his students find it “easier to text someone from 30 feet away than get up to speak to them.” From this fragment of testimony we can ascertain that students are texting during school, and that they are doing it even though the participants are in the same room. We do not, however, know what they were discussing, and subsequently do not have a complete picture of their exchange. Are they forbidden to move from their respective chairs? Is texting more efficient? Do they prefer to have a written record of their conversations? Do they enjoy the physical act of texting more than verbal conversation? Or are they perhaps eager to protect their exchange from eavesdroppers? Such questions may be addressed by related studies or provide the foundation for future investigations.

## I. ENVIRONMENTAL FACTORS

### A. The Changing Youth Environment

As mentioned earlier, an examination of youth NDM habits and behaviors alone gives an incomplete understanding of possible cognitive shifts in our target population. NDM – their production, popularity and obsolescence – are inextricably embedded in multiple social, economic, and cultural processes, what anthropologist Clifford Geertz (1977) referred to as a “web of meaning.” Broader cultural changes which may impact youth practices are frequently mentioned by our cohort of educators. Given our pool of participants, it is not surprising that most comments pertain primarily to school-related changes.

#### 1. Changes in Demographics

One overarching variable which appears to have a significant impact on observed change over time is that of youth demographics. The annual number of high school graduates in the United States has been steadily increasing over the past fifteen years and is expected to peak at about 2.9 million in 2009, as the children of the baby boomer generation reach adolescence (Finder 2008). While securing entry to a top-rated college or university has always been a challenge, there is a widely shared perception that the sheer volume of qualified applicants has increased the competition for coveted spots. Finder reports that admissions officers, with an eye on future demographic shifts, are also courting more Hispanic and low-income students, who have been underrepresented at the most prestigious private and public universities (Finder 2008) and are similarly underrepresented in the populations of the elite schools we investigated. The educators with whom we spoke reported that both students and parents alike are extremely concerned about the students’ ability to gain admission to a suitable college. This situation has resulted in part in an anxious student population unwilling to deviate from prescribed markers of academic success.

#### 2. Changes in Time Demands

Another major change in contemporary students’ environment is an increase in the type and intensity of activities they engage in. School-sponsored and external extracurricular pursuits, along with homework demands, combine to consume an appreciable chunk of a student’s non-school hours.

Afterschool team sports, for example, have become increasingly specialized and professionalized. Rather than playing a trio of sports throughout the school year, the typical athlete who evinces a measure of talent will be identified at a relatively early age and guided toward specializing in a single sport. While school sports are still played during a particular season (soccer during the fall, hockey during the winter, etc.), young athletes are encouraged to train year-round and to participate in informal ‘town leagues’ to stay in top shape.

With its subset of committed practitioners, early specialization, and year round practice, the shifts in athletics are similar, if not identical, to the performing arts and the outstanding students who seriously pursue their crafts. Both domains often require a high degree of commitment as well as long rehearsals and practices into evening hours that were previously reserved for homework. While the odds that these students will be able to convert their passion into professional careers are slim, students and parents alike often view excellence in these domains as another chit in the well-rounded college application.

Notable engagement in service learning or volunteering, a requirement at every school we contacted, is considered another potential feather in a college aspirant’s cap. Such service can encompass a variety of

experiences ranging from the mundane to the transformational. Whether service learning is considered a rewarding experience or simply a requirement for graduation, it consumes another block of time out of the busy student's day.

Once the school day is over, the typical student spends approximately four hours per night completing homework assignments. The amount of homework varies depending on the teacher and the class requirements. Some educators we interviewed do not assign any homework, while others estimate that a student could be expected to complete up to five hours of homework on a typical weeknight.

### 3. Changes in School Practices/Pedagogy

It should be noted that the educators that we spoke with are not typical classroom practitioners drawn at random from the several million American precollegiate educators. They enjoy a generation of experience in the classroom as well as the commendations of peers and administrators. They also teach in schools where there is more freedom in the curriculum. As mentioned earlier, many of our study participants teach at private schools, free from the travails of public funding and the mandates of No Child Left Behind (NCLB).

In general, students in the schools we investigated have more agency in the classroom. Educators experience a parallel diminishment of absolute authority, compared to past instantiations of classroom hierarchy. Overall, teachers are pleased by this development, maintaining that the loosening of hierarchical strictures has led to better communication and better educational practices overall. There is also evidence suggesting the loosening of boundaries between disciplines such as art, science, literature, and performance, and a willingness to incorporate different elements other than text into the curriculum. In a veteran educator's biology classroom, for instance, students can pick a research topic and also decide whether the final product will be a research paper, video, sculptural model, or another form of their own choosing. Several teachers cite how their pedagogies have been positively impacted by the ready availability of visual and multimedia elements online. Later in the paper we address pedagogical and student practices relating to new digital media resources.

The changes in classroom learning are also reflected in the physical reconfiguration of classrooms, with individual desks giving way to seating at shared tables or more communal clusters and the employment of more group work in the classroom. Similarly, the broadly popular practice of classroom based group work affords students more control over the subject matter, confers direct experience with a suite of collaboration skills, and situates the educator in more of a mentoring, guiding role.

We heard a great deal about the challenges these more constructivist practices pose with respect to appropriate assessments of these less formal classroom activities. Interestingly, several educators report that these practices, intended to liberate student learners from inflexible pedagogies such as passive learning, memorization, and standardized assessments, have inadvertently upset many parents and students alike. The conflict stems in part from the competition to gain access to selective institutions such as colleges or extracurricular programs, where more qualitative based assessments can be interpreted as problematic, rather than illuminating, alternative measures. Student X's "excellent" course grade, for better or for worse, is sometimes interpreted as a less rigorous assessment than Student Y's "A" or Student Z's "98."

In summary, the youth that our participants describe have less unstructured leisure time, with college-related pressures fueling many of their decisions. Our participating schools have adopted more fluid, flexible pedagogic approaches in the classroom over time, but these strategies are both a source of

creativity and stress for students and parents as they prepare for fierce competition to matriculate to the college of their choice.

Our educator participants report that the youth with whom they work are all too often sleep-deprived, anxious, stressed, and afraid to transgress established rules and possibly jeopardize their chances of getting accepted by their preferred college, likely fueled in part by the increased pressures surrounding college admissions, the rise in afterschool commitments, and concerns around assessment strategies outlined above.

## B. New Digital Media Use

Along with a number of offline outlets, both healthy (peers, informal social groups, creative expression) and less healthy (drugs and alcohol abuse, media overconsumption, etc.), there are many ways youth use NDM to cope with the numerous demands of adolescence. These strategies include reliance on rich external support systems such as peers, counselors, and adult mentors; enjoyment of flow-like states while engaging in videos games; and employment of well-honed executive function skills (careful planning, schedule management). With NDM, youth have a collection of tools for information gathering, creative production, entertainment and social networking. In the following section, we describe the basic characteristics of youth digital media use as reported by our study participants.

In order to get a better sense of how our target youth are spending their time with NDM, we queried educators on their own level of digital media engagement as well as what they have observed with respect to their students' uses. While educators were less able to report credibly on their students, who may engage in a variety of behaviors outside of their view, we feel comfortable in postulating significant variations of media use and types of engagement between educators and students. We remain mindful of possible personal, experiential, or generational biases that may influence educators' opinions. However, we believe that the depth of our interview process, coupled with the size of our sample, helps to neutralize these concerns.

Here we summarize the most popular internet uses, as gleaned from our semi-structured interviews and postsurveys.

### 1. Educators

School adoption of NDM materials appears to conform to a classic wave pattern. The period of peak adoption occurred between 1995 and 1999, with 38.5% of respondents adopting a variety of NDM tools during that time period, followed by a slow and steady decline in new adoptions through 2002. Educators report that they use computers and the internet primarily to conduct research (55%) or otherwise read/watch online content (27.5%), as well as send and receive email. We are mindful of the fact that our educator cohort, given their years of teaching experience, is likely older than the average high school teacher, and the NDM habits of this group are not necessarily reflective of the typical educator.

### 2. Students

Our educators report that students have a strong affinity for computers and the internet. A computer's outstanding characteristic is its ability to accomplish a wide variety of tasks, drawing in so many functions in a single device. NDM offerings are seen as a "perpetual virtual party," offering fun and games on demand. Educators also report that students are particularly attracted to the internet, describing youth online use as "a river that never stops" as they engage with "the world at their fingertips" through this digital "portal to the rest of the world." As for who is engaging with this enticing virtual world, few if

any of students elect to not engage online or do not have access to hardware.

Our educators could not speak to the typical student's first introduction to digital media, a finding that leads us to believe that students likely start NDM engagement prior to high school. Educators were able to report, with a reasonable expectation of accuracy, that with respect to in-school NDM usage, 50% of students were habitual users of email, followed by social networking sites (42.5%), text messaging (40%), using the internet to conduct research (40%), and consuming online content for non-research purposes such as entertainment sites and YouTube (30%). Most educators are less confident in their ability to assess out of school NDM usage, although our cohort includes boarding school housemasters with a privileged view of youth's afterhours activities. The most popular activities for students outside of school are social networking sites (75%), text messaging (42.5%), and offline socializing with friends (32.5%). Overall, the most popular reported activity for youth is using a cellphone to exchange text messages.

While not privy to the content of these messaging activities, our educator participants note that adolescent girls tend to conduct intense relationships primarily with other girls, while their male counterparts engage in a great deal of online flirting with the opposite sex. Adolescent males are more inclined, however, to socialize around a shared activity, such as a video game or a team sport. These findings suggest that youth use the computer primarily to communicate with others and to consume entertainment, i.e. downloading movies or watching multimedia clips. They will often engage in these activities when the opportunity presents itself regardless of physical context, typically sharing these activities with friends and family.

In the subsequent sections, we analyze the results of our investigations relating to changes in the mental models of the typical student as described by our educator participants.

## II. RESEARCH FINDINGS

### Gradations of Change

A myriad of social, cultural, economic, and intellectual factors appears to influence cognitive shifts over time. We do not investigate the frequent claim that NDM prompt changes in the actual structure and functioning of the brain. Such changes would likely take place at a pace which would be difficult to identify with current investigative methods. Rather, we focus on changes to an individual's 'habits of mind,' the mental models which direct how he or she engages with the world.

It is important to acknowledge that while a certain number of identified trends reflect changes within our fifteen year time period, they are also indicative of broader social and cultural shifts which predate NDM. General youth preferences for breadth over depth with respect to learning cited by our educator informants, for instance, may be exacerbated by NDM resources, but this trend has been a longstanding challenge for educators regardless of technology. Similarly, the typical teenager's tendency to give process short shrift and to prefer spending time with entertainments may speak more to his or her developmental limitations or predilections than any direct impact of NDM. A strong preference for computer-based visual and multimodal engagement find many relevant parallels in a generation raised on television and already acclimated to sitting in front of a screen and consuming pixilated images. Finally, as far back as a century ago, the introduction of the telephone into the home triggered arguments related to 'stranger danger' and the perils of disembodied conversations which characterize the discourse around contemporary online social practices.

We acknowledge these trends with deep roots, but also identify the ways in which NDM impact longstanding practices. With respect to screen-based visual information, for example, engaging with a computer interface often differs dramatically from watching TV in terms of choice of programming, level of cognitive engagement, and socializing around the activity. Viewing a video on YouTube is much like viewing a video on other devices; however, with YouTube, it is also possible to be a video producer. Users can dialogue with online commentators, and – with a few simple clicks – share humorous video content with their online friends.

The educators we spoke with feel strongly that while certain behaviors have in fact changed over time, the fundamental goals driving youth behaviors have remained the same. A high school physics teacher is fairly representative of many of our participants, gently insisting that there has been no change in how students learn or spend their time, what excites and interests them, and that the students often make 'interesting' choices for themselves. Friends remain of paramount importance to adolescents. As one educator puts it, "Students want to be smart, popular, accepted, and know what makes them special." School remains a legitimate pathway for cultivating mastery and competence in a variety of domains. And through it all, adolescents build upon what they know, who they are, and who will join them on their journey.

### Multiple Worlds

Within the context of the developmental trajectory of typical adolescents, NDM appear to be having a significant impact on how they identify and engage with both people and information (it should be noted that the processes identified in our study may not be limited exclusively to adolescents, with many adults demonstrating similar tendencies in their NDM practices). One fact, however, stands out: the sheer ubiquity of NDM in their lives suggests that the students we heard about are, at any given time, dividing their attention between online and offline. One arts educator speaks eloquently about this phenomenon: "I

feel that the kids carry multiple worlds around with them now in a way that they didn't before, so you can have a kid who's really incredibly connected, reads *The New York Times*... but that same kid is also carrying already all these private worlds as well... families, friends, summer camp people.. It's more what worlds do you choose to keep continuing with these kids?" We see evidence of these overlapping multiple worlds throughout an adolescent's day: when homework is multitasked with social networking and downloading music, when earbuds that block out conversation are worn in social settings, and when an internet search is conducted during class.

Youth are participating in online social networking sites such as Facebook or MySpace, and are also plugged into or tuned into ancillary devices such as iPods or phones at any given time, and in a variety of contexts: in the classroom, at home, with friends, alone in one's bedroom. In short, NDM in the typical teenager's life are pervasive and constant, regardless of the social setting, both allowing them to engage vigorously with others and isolating them to varying degrees from their immediate surroundings.

Greater demands on student attention (whether more activities or more distractions) and the rise and pressure of multitasking also pose challenges to students' capacity to sustain attention and to engage in reflection. What students pay attention to also appears to be shifting, with less patience for listening and reading and a correlative greater attunement to the visual. NDM offer greater access to more image-based teaching and learning, possibly prompting a shift in how students gain and present knowledge. In particular, educators report that NDM strongly impact the research process, opening access to potentially overwhelming amounts and new types of information. Teaching students how to research and analyze information in the new media landscape presents both emerging challenges and opportunities for educators and students alike.

## A. STANDARD COGNITION

Broadly speaking, cognition refers to the mental processes involved in how we think and how we come to know and understand various kinds of materials. This section addresses a range of cognitive abilities, focusing on those involved in school and home tasks. These abilities include attention and information acquisition (particularly within the context of student research), as well as higher-level functions such as textual and visual information processing, reflection, and imagination. Cognition in the social realm is discussed in a separate section.

Across our interviews we heard about changes in students' relationship to information in terms of access, quantity, quality, consumption, and display. Somewhat jokingly describing students today as a "wide-based, information sucking army," a music educator reflects thoughtfully on the different ways students respond to the vast amounts of information that they can readily access via NDM. He finds that students may tend toward more narrow, niche interests. But he also suggests that, even more powerfully than in the past, today's students can bring new and stimulating information to the classroom that they would not necessarily have encountered in earlier decades. Many of the educators we spoke with similarly share complicated views about students' relationship to information and the potential to engage with more and different kinds of information. How students "filter" all this information and at what levels they engage with it present major challenges to current teaching and learning practices.

## 1. Attention and Multitasking

### a. Changes in attention over time

When asked about the types of cognitive skills exhibited by today's students, a large number of our educator participants cite change with respect to issues of attention, primarily shorter attention spans and greater distractibility. (One subject, however, specifically comments that students have long attention spans and are noticeable for *not* having changed. This may be due in part to that particular school's environment of self-selected, independent students, although many educators at the private schools in particular note an increase of stronger students). Greater awareness of attention issues, as several educators remark, stems in part from the increase in attention-related diagnoses like Attention Deficit Disorder (ADD), as well as shifts in pedagogical approaches and understanding.

One educator with over 40 years of teaching experience notes that classrooms have always been a mix of focused and distracted students. However, according to several other educator participants, students today appear to have more difficulty reaching a depth of concentration for any length of time. In particular, many of the educators we spoke with find that their current students have a harder time sitting and listening. In part as a way to address attention issues, most of our educator participants integrate a variety of teaching styles into their practices: they employ more student-centered activities, incorporate more images as attention "hooks," and/or insert more deliberate shifts in attention, or so-called "commercial breaks" in the words of one chemistry teacher.

### b. NDM and changes to attention over time

Explaining the change in attention spans from 15 years ago, several educators attribute students' shorter periods of focused attention in part to the rapid flow of information and communication with NDM. A few educators further cite a greater impatience and frustration with delayed gratification, perhaps in partial response to the sense of immediacy to which students have become accustomed due to new broadband technologies. Moreover, according to a biology teacher, students appear more "distracted by technology," with email, iTunes, cell phones, IM, television, and video games competing continuously for attention.

Quite a few educators also mention the related issue of multitasking; that is, doing many things simultaneously and usually incorporating various media (digital and electronic), like cell phones, the internet, and television. As one history teacher puts it, students today "multitask like crazy." Multitasking appears to correlate with the increased busyness of student lives, a need to know more, and the ubiquitous adoption of NDM. Although they could not always report this state of affairs from direct experience, our educator participants often gave examples of how the typical student multitasks, combining partial listening while engaging with multiple programs on the computer and/or personal digital device. According to one visual arts educator, this setup characterizes their preferred work environment; access to various NDM tools is in effect required now for students to be able to focus on their assignments. Although educators may perceive this practice of split attention as distracting, secondary to task, and rude to the speaker, they observe that students feel they cannot concentrate until they have monitored the status of their various NDM information streams.

The educators we interviewed differ in their views of the effectiveness and impact of multitasking. According to some, students achieve incredible balance managing their multiple worlds. Other educator participants suggest that multitasking potentially impacts both the quantity and quality of student work. One physics educator attributes students' tendency to do "snippets," or "little pieces of information" –

something many educators mention as well – to the culture of multitasking, with the implication that students may lack the training or capacity to focus singly and sharply for extended periods of time. Similarly, many educators observe that multitasking often indicates a decrease in students’ ability to compartmentalize and stay on task, and they link multitasking with an increased level of distraction. However, one English teacher with whom we spoke suggests that students develop better executive-level skills to counteract all of the distractions. She also acknowledges that focused attention remains a struggle for some students, particularly boys. Those we interviewed generally find that students still manage to complete tasks, though for many it seems to take longer, and, as we heard from a few educators, students are generally just more tired.

## 2. Student Research

### a. Changes in student research over time

The subject of student research presents one of the areas in which many of our educator participants cite significant change most apparently connected with NDM. With the proliferation of NDM, research practices have been overhauled. Virtually all changes relate in some capacity to how these new technologies have transformed access to information. The internet now constitutes students’ primary research tool, largely replacing books and visits to the library – to the point of prompting some educators to require a small number of actual books be consulted. According to a biology educator, research with books allows for more time. With the internet, it is now all instant gratification and students are “bursting with information.” The educators we spoke with largely embrace and seek to employ the opportunities afforded by new technologies; yet, they may also be challenged in part by traditional views of youth learning.

### b. NDM and changes in student research over time

#### Finding Information

In the words of one history educator, students still write “old-fashioned” research papers, but rely on “new-fangled” internet sources. These sources can include blogs and Wikipedia, as well as greater access to primary materials such as historical documents or original recordings. Our educator participants frequently characterize this new means of acquiring information in terms of its overwhelming, instantaneous, and potentially superficial qualities.

Students’ use of the internet transcends the boundaries between work and play. What once had been a chore offline can seem like a game online. A theater educator, for example, finds that information seeking today more closely resembles a search game, one that blurs the distinction between work and play. When assigned to choose a monologue, his students used to go to the library stacks and comb through theatrical scripts or anthologies, an experience that felt like schoolwork. Nowadays they will start with the internet and find readily available movie scripts.

Although our educator participants are pleased with the wealth of information available to students today, they also express concern about possible information overload. As one history educator puts it, “The act of research has totally changed, it used to be a hunt and now you’re swimming in it.” Many of our educators find that their students can easily and quickly locate various sources online, but they can also get lost and waste lots of time.

The speed and easy availability of the internet form part of its lure, notes a music educator. Another music instructor ventures that the “computer age” propels learning at a faster rate than in the past, and describes students as resistant to doing something the “slow way.” Instead, today’s students look for shortcuts, often online. For example, when assigned to look at paintings and think about their relationship to aspects of music, her current students choose to go to a museum website rather than make the trip to the actual museum. She explains that if students only engage with the visual arts on the computer, they miss the sense of scale, texture, and more visceral aspects that derive from direct experience. She further proposes that the access to greater information provided by NDM enables a greater expansiveness, although it may be harder for students to explore in-depth interpretations, subtle phrasing, or the diverse psychological/emotional aspects of music.

The internet’s large stores of information and the potential for broader knowledge are cited as benefits, for both educators and students. As a physics educator recounts, it was more self-limiting when teachers directed students to specific books. Acknowledging that students can now more easily and independently “plumb the depths” of a particular subject, our educator participants also explain that with access to vast amounts of information on the internet, students correspondingly require better “filtering” mechanisms. However, it appears that many of them do not possess such skills. As one athletics director observed, students today do “a lot more searching and a lot less digging.”

A dance educator describes the problem of student research today as “factoidal,” meaning that it remains at the level of information gathering and lacks synthesis and analysis. Similarly, a theater educator claims that students can quickly process a lot of information that exists on the surface, but the implications of that information may escape their notice. Across many interviews, our educator participants report that students today spend less time processing information and forming original thoughts.

A student who successfully locates a large number of internet sources is now faced with the new challenge of sifting through and assessing a surfeit of information. According to a theater educator, students also tend to assume that information found online is correct unless they happen to stumble upon contradictory data. Perhaps more so than in the past, points out one English teacher, the challenge with student research today is teaching students how to acquire good information and evaluate it.

### Synthesizing Information

Synthesis is a critical process of digesting multiple sources of information and combining them for a new, coherent understanding of the topic (Gardner, 2007). With students processing everything so fast in “sound bites” or “bullets,” however, a theater educator finds it a challenge to get students to slow down and discuss something in broader terms – to “look in more than they look out,” a process that takes more thought and direction than simple digestion. She continues that with students’ greater exposure to more information, “their heightened awareness of the world” may in some ways prevent them from delving deeper. In a slightly different vein, a visual arts teacher suggests that students are intimidated by how much they feel they should know, making it harder for them to identify and reflect upon connections.

Several educators attribute observed student changes in information processing in part to the increased pace of information and the additional limitations on student time as compared to earlier students. Other educators speak to a greater student emphasis on product over process. For example, a music educator claims that her students focus more on achieving proficiency and “moving on.” They do not understand why they should be more involved in the process and how it could move them to the next level.

Some educators relate the lack of adequate synthesis back to attention issues, with less patient students less likely to be contemplative. A biology educator, for instance, observes that her students increasingly do not want to take the time to process and, instead, they look to her for more explicit instructions. A

history educator adds that a big change with the current generation is that students have more difficulty feeling comfortable with an interpretative stance of their own, a situation that impedes their ability to synthesize and think independently.

The educators we spoke with appreciate that NDM can help them not just to give information to students, but rather to think, be creative, and to apply their learning in an active way. Yet, while students report their desire for such opportunities, they also display resistance. Students are consumed more with earning good grades and increasingly look to educators for direct guidance. They are reluctant to take the time to engage more comprehensively in the process of learning. NDM present students both with the opportunity to explore wider issues and obtain materials quickly without pausing to reflect.

### 3. Creativity and Imagination

#### a. Changes in creativity and imagination over time

While not an area specifically addressed in our interview protocol, changes in student creativity frequently came up in our conversations with educators. Not only those from the visual arts, music, and theater, but also various educators from a range of disciplines, spoke to issues relating to changes in youth creativity and imagination over time.

Some educators report no change in student creativity, while others observe a greater reluctance toward taking a creative leap, fewer opportunities for creative expression, and/or a decline in creative and intellectual risk-taking. A theater educator, who bemoans various losses in student creative exploration, still remarks that today's students are "surprisingly wonderful" at improvisation. Various educators mention a decline in self-directed creative play among youth, particularly with reference to outdoor play and play without the use of electronic and digital devices like video games. For example, one English teacher finds that her students today "don't know how to create their own play." An athletics director, who does find that her students have remained just as creative in developing games, instead identifies a loss in time spent outside playing and interacting with nature.

Although our educator participants attribute these perceived changes to different reasons, they frequently associate a perceived lack of creativity to a corresponding lack of time to engage in such tasks. Another athletics educator, who observes that students now struggle to devise games, describes the biggest change today for students is that they are over-programmed in virtually every arena.

#### b. NDM and changes in creativity and imagination over time

More specifically associating the loss of imaginative play to NDM, namely video games, a theater educator wonders if there is a corresponding loss of tactile senses and creativity in youth, which he correlates to the declining ability to use traditional tools for craft. In contrast, a music educator observes that her students now develop muscle memory faster from frequent QWERTY keyboard use, bypassing a certain kind of traditional piano learning because of the tactile training gained from using computer keyboards and playing video games.

In terms of creative production and inspiration, one music educator suggests that students who use the internet creatively can transform online content into original material. Video games increasingly feature in students' creative stories, mostly among boys, according to a visual arts educator who teaches film-making. At the same time, however, she sees the incorporation of video games as an excuse for the reuse of old plots. A humanities teacher also finds gender differences in creative stories, with girls focusing on

relationships with others and boys overcoming obstacles through sports. He notices that his students today may refer to pop culture or to past experiences, but finds there is little reflection on either. Moreover, in comparison to past cohorts, the stories devised by today's youth increasingly tend to be set in the present or future, as well as being shorter, more simplistic, and less involved, with fewer characters and less conflict. In the visual arts, one of our educator participants claims that imaginative play seems to persevere around the appropriation and reuse of existing images, such as comic book figures or random appealing images found online. It is more radical, she says, for students to create something new because they are bombarded with images of how to think and act.

A music educator, attributing his comments in part to students' experiences playing video games, describes his students as displaying a greater willingness to engage and try new ideas, revise, and discard. However, he also remarks that if a task entails a school expectation, students today exhibit a greater fear and are less willing to take creative risks than previously. Noting that the fear of failure has a big impact on creativity and that teenagers in general are risk-averse, a visual arts educator finds that her students today appear more gun-shy to try things in which they think they do not have expertise – an observation shared by several educators, particularly in relation to increased academic and time pressures. She additionally comments that digital media contribute to an increased expectation of excellence with a corresponding diminishment of joy in mastery. Yet, another visual arts educator points out that computers can be an “incredible hook” to get past the fear of the blank page for making art.

From music educators, we similarly heard that the high quality of digital recordings expose budding musicians to technical perfection, thereby raising the baseline, but also perhaps generating a greater demand for music to communicate meaning beyond technical proficiency. One music educator suggests that by listening to high quality recordings of their own work, students can point out their own mistakes and confront them themselves, something that may additionally enable them to cultivate empathy for other performers. He explains that such recordings provide distance, facilitating a move to metacognition because through technology students can assume the roles of both performers and audience. He further remarks that today the computer can more generally offer an essential tool for creation, particularly for composition. And the computer provides privacy for creativity through its potential for a wide realm of choice and as a form of freedom from “normal adult constraints.” Whether NDM shape new criteria for excellence and whether they offer new tools and ways that encourage and/or inhibit creativity remain as intriguing questions.

#### 4. Text-Based Teaching and Learning

##### a. Changes in writing and reading

The educators we interviewed speak of varying degrees and types of changes to writing and reading among their students. Whether related in some ways to NDM or not, several educator participants more generally observe a “gap in writing skills.” For example, one educator suggests that student writing has weakened in part due to an emphasis on math. Such “gaps” encompass structural and compositional problems, as well as greater difficulties with syntax, grammar, and expressing complex ideas on paper. A couple of teachers that we spoke with, however, find that academic writing has improved. This testimony may have to do more with particular schools and students' prior academic background, which, as a history educator surmises, trains them to be more linear thinkers, “at home with the printed page...and written word.” He explains that at present he is more likely to flag imprecise word choices than structural problems.

One of the most frequent comments we heard with regard to changes in student writing is a reduction in working language, namely, the use of a rich and varied vocabulary. Among the several educators who

speak of a decline in vocabulary, they also often comment that students who read more have greater vocabularies. Comparing the writing skills of non-readers and readers, one art and media specialist explains that non-readers would rather ingest a story via media (e.g. television, movies); they tend to use slang and consider writing difficult.

Even among the educators who find that writing seems to have improved, they and many others remark that reading printed texts has decreased. Why students read less today is unclear. One reason, proposes a long-time English teacher, is that there are so many other things to do. An athletics educator suggests that students no longer read fully, but rather just what they need for an answer. Related to this observation, an educator, who has been teaching for 50 years, claims that students interact less with texts, do not reflect, and just take in information.

#### b. NDM and changes in writing and reading

As one history teacher reports, the biggest change in writing is the ability to revise because of technology. Another history teacher suggests that students now want to edit perpetually. (Reasons for this desire to edit continually are unclear, though from the interview they appear to stem in part from changing standards, [perceived] higher expectations, less risk-taking, and a focus on grades.) According to several other educators we interviewed, however, students do not proof or edit as much as before, even though they generally write on computers. Reasons for this state of affairs range from students considering proof-reading an “arduous task,” they are too overloaded with activities, are lazy, or because superficially their papers ‘look’ polished. One educator of almost 50 years claims that student writing, when done on a computer, is not as organized and coherent, though she also finds that the overall quality of papers over her decades of teaching is no better or worse.

A few educators remark that they can tell when student work is written while students are multitasking, particularly when interrupted while IMing. Such papers jump all over, lack transitions, express incomplete thoughts, and are unedited. One social science educator further comments that she notices the effects of texting and IMing on language and how students form sentences. They tend to be incomplete, devoid of color, and lack embellishment.

The attribution, at least partially, to the impact of NDM on the decline in print reading as well as on changes in reading habits recurs across our interviews. Typifying interview comments, a theater educator explains that in the past he could assume that students would read, whereas now they spend more time online with feeds and links. A history educator proposes that reading in chunks online makes students less comfortable reading long texts. A visual arts educator suggests that students are reading more computer correspondence and fewer books, leading to a decline in more imaginative forms of reading.

Two humanities educators discern a further possible impact produced by decreased reading. They observe that their students today have greater difficulties creating mental images derived from language, especially if texts are read aloud. They find instead that students are better at purely visual rather than textual processing. As other humanities and social science educators point out, reading itself is now more visual, for example, with graphic novels, as well as online with its greater interaction between graphics and words.

## 5. Image-Based Teaching and Learning

### a. Changes in imaged based teaching and learning

Students today are “keyed to the visual,” declares one English teacher, characterizing a widespread observation among those interviewed. After nearly 50 years of visual-based entertainment media such as television, film and graphic novels, the general student preference for image-based modalities may itself not be a change. However, as an educator of almost four decades suggests, what students now expect in terms of imaged-based learning in the classroom has changed. For example, students in the past were delighted with any audio-visual in the classroom in part because of its novelty, and because it meant that the day’s lecture would not be the typical didactic presentation. We heard numerous accounts of educators increasing the visual components in their curricula as they decrease the amount of reading, in part to acknowledge and accommodate non-text youth learning preferences. These shifts in pedagogical practices demonstrate some of the flexibility and openness exemplified by our educator participants. Yet, the trends may also raise questions of how much to adapt to and how much to challenge changing student preferences and learning styles.

### b. NDM and changes in image-based teaching and learning

Expressing a challenge echoed by many of our educators, a musical theater educator explains that since students today display less patience listening, the integration of more visual materials helps keep them more engaged. Many of the educators we interviewed describe using images – from the internet, with PowerPoint – as hooks to greater listening. For both educators and students, the internet offers better quality (in terms of presentation) as well as greater and easier access to a wide-range of visual and audio materials.

There is no consensus from our educator participants on whether NDM help or hinder students to visualize and envision. The English teacher who describes students today as “keyed to the visual,” also somewhat paradoxically claims that her students “can’t visualize.” She observes that students often imagine something connected to a previous visual experience, more often something commercially popular and screen-based like a video game, rather than something derived from language. This increased engagement with screen-based culture may be why a visual arts educator not only finds his students influenced by the internet in their use of given images and clichés from pop culture, but also in their preference for flattened space over perspective and straight lines over diagonals. His comments are echoed by another visual arts educator who notes that visual references to popular media, like television, have long existed. He finds that students are particularly fixated on photographs, preferring to draw or paint from them over nature because everything is already flattened onto one plane.

Several educator participants across academic disciplines describe the use of external supports to help students visualize activities. Our informants suggest that the wealth of imagery available from NDM helps students to envision and even spark the imagination, enabling them to reference multiple pictures and therefore be more specific about how they see and describe imagery, or enact something new. For example, an athletics educator explains how the use of video helps to model new skills for students. When she introduces students to an unfamiliar Indonesian game, they initially find the game too difficult because they are not good at it. After watching a video of high-level playing, however, students are able to understand it better and subsequently improve their skills and increase their enjoyment of the game. According to this educator, students are less able to imagine how the game is played until they see the clip.

Students today, a science educator suggests, are more visually stimulated because they are “out there” online, and educators seek to provide corresponding teaching and learning opportunities. A music teacher whose school just installed a new music technology lab hopes that it will offer another way for students to engage in the arts by creating more “visual music projects.” A biology educator, who gives her students the autonomy to select the medium through which they may gain and present their senior research projects, has noticed a shift over time from traditional papers to more multimedia projects. Similarly, when describing how he thinks NDM impact student thinking and processing, a history teacher proposes a shift in how students will structure a persuasive argument: students will rely less on written evidence and incorporate more audio-visual forms. Identifying the interactive nature of teaching and learning through technology as a “revolution,” a music educator finds the challenge for teachers today is to take advantage of this revolution.

## B. SOCIAL COGNITION

Social cognition is a broad term that encompasses an individual's internal habits of mind for understanding other people, the individual as a social entity, and the aggregation of social knowledge that allows the individual to function in social settings (Beer & Ochsner, 2006). Social cognition differs from standard, non social cognition primarily in its reciprocal nature and its reliance on communication strategies (Actor X is engaging not with an object but with Actor Y), with both participants able to adjust and adapt their behaviors accordingly (Markus, 1985).

How does the typical teenager in our sample engage with the external world? How does he or she behave with teachers and peers and parents? Have these characteristics changed over time and, if so, to what extent do these observed changes align with NDM use? In this section, we examine changes in youth presentations of attitudes and behaviors within their social environment – family, friends, and peers. While our study does not include an analysis of what specific NDM content youth engage in or what youth text or talk about, we were able to capture a broad picture of NDM usage across a variety of social contexts. In some ways, NDM have been integrated into the social fabric in ways similar to earlier technological integrations such as the widespread adoption of telephony in the early twentieth century. In other ways, many NDM social practices appear to be unprecedented.

We first examine the changing dynamic between young people in our study and the parents, teachers, and other adult authority figures in their world. Via NDM, youth are able to contest knowledge, contribute to pedagogy, and dialogue with educators in a new, more informal manner. NDM also provide their parents a measure of (perhaps false) security, allowing students to explore online while harnessed to a digital tether.

### 1. The Student-Parent Relationship

#### a. Changes in student-parent relationship

A significant change in most students' social environment between 1992 and 2009 is their relationship with parents, and the parent/school relationship. Educators report a gradual increase over time in the level of parental involvement in their children's lives. Many contemporary parents struggle to balance the role of a friend vs. the role of the child's primary caretaker and disciplinarian. Parents are described as "more anxious" to ensure the success of their children than in the past. They exhibit this anxiety by remaining in constant contact with their children, running interference between the student and the education process.

In general, our educators report that parents trust school educators and administrators less now than they did in previous generations. Parents often defend their child's school transgressions in "blind, irrational ways," defend against accusations of cheating, lobby for grade changes and the extra time on tests. Similarly, many parents will intervene earlier when a child shows signs of perceived disadvantage or an academic or social decline. For instance, in the past, students with substance abuse problems would hit rock bottom before action was taken. Now, students evincing telltale signs are quickly reassigned to special programs by parents. Tutors are hired, and sometimes, parents even complete their students' school assignments for them. Says one educator, "Parents are willing to do nearly anything to protect their child's reputation." Other educators in our study report that students are attached to their parents to the point where it protects them from experiencing any type of meaningful failure and compromises their personal sense of independence.

## b. NDM and the student-parent relationship

### Parental Involvement and Intervention

Paradoxically, NDM appear to both allow parents to assume greater control over their child's life and allow the child to elude more comprehensive parental control. Several educators report that parents and students stay in close contact via cellphone throughout the school day. This elevated rate of contact, along with peer-to-peer cellphone communications during class, has prompted certain schools to implement rules restricting cellphone use during the school day. One of the most prestigious schools in our study was not able to implement any rules limiting cellphone use, as parents objected and argued that in the event of another Columbine-type massacre, one's cellphone may become a lifeline.

Parents are also involved in other aspects of their children's NDM life, such as friending their children on Facebook and/or periodically monitoring their accounts. One educator notes an interesting dynamic where parents rely on technology to monitor their children to such a large extent now, there has been a "decrease in adult monitoring because the technology created change in how adults intervene." In other words, parents may be comfortable in the knowledge that their child can contact them in the event of a mishap, large or small. But by heavily subscribing to a model of "on call" parenting via a cell phone connection, they depend on a teenager's conception of what constitutes "trouble," and that this trouble will in fact be shared in a timely and honest fashion.

### Sons and Daughters More Elusive

While our methodology makes it difficult to assess the extent to which youth use NDM to elude parental controls, several external research groups are investigating the details of youth engagement online, ranging from ethnographic analysis of youth social practices to more quantitative examinations of online engagements. Though the details vary, there is an emerging consensus that many sites on the internet are directed by users; for youth, this means spaces online which are mentor-free, peer-mediated spaces in which to engage, and in which they can create their own rules (Bradley, 2005; Ito et al., 2008; Jenkins et al., 2006). In a later section, we address some of the characteristics of peer-to-peer relations online, considering whether these behaviors are familiar rehashes or novel recastings of existing peer social dynamics.

In our study, a few teachers mention students utilizing the internet and online social networking programs as a way to escape from the largely adult constructions of the offline world. Before the proliferation of cellphones, a teen's landline conversation was based in the home and was easily monitored by both adults and curious siblings. "For students now, there are lots of ways to circumvent parents," says one educator, as students are "largely unsupervised now."

## 2. The Student-Educator Relationship

### a. Changes in the student-educator relationship

Nearly all the educators we spoke with report that their current students are comfortable with authority, evince fewer disciplinary issues and are less willing to challenge authority or take political or intellectual risks. A middle-aged English teacher bemoans that his students today have less "edge" now, an "odd complacency," greater apathy, a "don't care attitude," less energy, and a certain "dullness." However, he also reports that youth are concerned about getting caught breaking the rules. Another participant hints at the possibility that rules today are being transgressed, albeit more covertly. It may be that more youth are

internalizing the rules of their elders, or that a surface acquiescence is masking a more oppositional position. In either case, educators report a higher percentage of youth eager to please.

An important corollary to playing by the rules is first determining what the rules are, and then insisting on their consistent application. Judging from the responses from our participants, students have grown increasingly adept at being able to “negotiat[e] a contract for success” with their teacher. One educator reports that students generally cope with failure better once criteria for success have been made clear in advance, and that his students need to know how such decisions are made. This open dialogue between teacher and students, he opines, cultivates a trusting relationship. A history teacher with over forty years in the classroom tells us that students think about fairness in terms of how they are treated by individual teachers, crave consistent application of the rules, and are vocal in their objections should the rules be transgressed, regardless of the transgressor.

Students are equally concerned that there is adequate supervision on hand. An athletics director in an elite private high school reports that when he instructed his students to play outside without a referee, they were confused, unable to function without a supervisory presence, and wedded to traditional play practices. “Students want to win and be told they are right by an official,” he tells us. He expresses concern that the involvement of an outside authority erodes player trust – there is less of a need to monitor one’s behavior when a referee is on hand – and a decline in the ability for players to monitor themselves.

While most students are reasonably comfortable discussing changes in the rules of the classroom, for the most part they elect to adhere to established guidelines laid out by educators and school administrators. As described earlier, educators increasingly rely on student-centered, constructivist pedagogy. They report that in addition to freeing students from traditional educational practices, constructivist approaches can often cause confusion and distress for their students. Educators report that students ask for clarifications relating primarily to product (not process), such as “Just tell me what to do” and “What [answer] should I get?” Our researchers frequently hear comments such as students “need a rule for everything,” “just want to cut to the chase and get to the product,” and “won’t do things without supervision, a very structured, very laid out path.” One educator describes that while students are comfortable investing in school-assigned work where they are granted a degree of ownership, they do not know where to start when they are empowered to “do what they want.” “They love having someone telling them the 1-2-3-4, ‘do it,’ and they will do it. If you tell them... just do it, they will come to you and check with you every other minute... ‘am I doing this right, is this what you want?’ If you ask them, ‘what do you think?’, they’re speechless.” In addition to the pursuit of the “right” answer, a few educators mention a reluctance to “go above and beyond.”

As a result, the educational experience is frequently reduced to, as one teacher articulates, students approaching learning as “a series of checklists” and finding the unexpected and unpredictable an implicit violation of the student-teacher contract. While educators in ordinary arts classes report that their students find their classes and extracurricular activities a welcome release from school pressures, students in specialized arts programs struggle with the same intensive pressure to succeed as do their more academic peers. Notable exceptions can be found in contexts where the importance of a class grade is diminished or eliminated altogether. One history teacher, for instance, uses a student’s score on the AP history exam as a course grade.

## b. NDM and the student-teacher relationship

NDM have not only altered the nature of school assignments; they have also impacted how students and educators relate to each other on personal and professional levels. Many of these changes relate to a shift in power and agency from educators to students. While some of these shifts are the product of deliberate pedagogical choices, such as the rise in constructivist classroom approaches, others appear to be the unintended consequences of technology.

### Modified Communications

Our participant educators report a “stupendous” increase in communications between themselves and their students as compared to pre-NDM levels, with most of this increase the result of NDM. In the past, communications were generally limited to face-to-face exchanges between teacher and student during the school day or during extracurricular activities. While informal face-to-face engagement between educators and students has declined, a student now is more likely to communicate a variety of concerns to an educator via text, a process that generally did not happen in the past.

Students generally do not IM their teacher, a mode generally reserved for engaging closer associates. However, they are comfortable emailing questions relating to class assignments. Educators also appreciate the ability to exchange asynchronous messages with students. Email’s popularity may stem from a number of reasons, including NDM’s speed, efficiency, convenience, and ability to negotiate thornier issues from a safer, rehearsed position. It is easier, say educators, for students to text or email difficult conversations versus conducting them face-to-face, when problematic emotions and unexpected interactions may emerge.

Despite its convenience, email exchanges can inadvertently “muddle communications.” Given youth’s facility with NDM-based communication, there is an assumption that they are naturally proficient in using them. But about a quarter of our educators claim that students do not acknowledge the need to use a different voice when corresponding with them, and that in general, students “don’t think about tone” and “need to distinguish [tones] for different recipients.”

Overly casual emails from students are sometimes negatively interpreted by educators as showing a disregard for their professional roles. A few educators mention the need to have explicit conversations with students around email etiquette: “They write [me] emails that start with ‘Hey!’.” Several educators comment on this lack of acknowledgement of different audiences. Others report that they enjoy the more casual nature of these more informal email correspondences versus the more formal exchanges they used to engage in. A few caution that these exchanges may entail students disarming them with friendly overtures, while saying what they believe the educator wants to hear. Others interpret the casual nature of online communications as reflecting a diminution of student respect, and of teacher authority.

Students, who often spend their evenings online engaged in a variety of activities, may expect that their teachers will also be online and will answer their queries very quickly. Educators report receiving student emails about the following day’s assignment late the prior evening. One science teacher and school administrator in a New Hampshire boarding school had to instruct his students not to email him after eight at night, and then not to expect an immediate response.

### Technical Savvy

A student assisting an educator in the classroom with technological tools is not an entirely new practice. In the past, a teacher might have struggled with the slide carousel, the VHS player, or the overhead

projector, and either asked for assistance or accepted an offer of help from a student. Today's digital tools, however, are ubiquitous, more complex, and are often used by students in their free time.

Virtually all of the educators with whom we spoke consider their students far more "technically savvy" than themselves, with students customarily remedying problem technologies ranging from classroom tools to broader institutional infrastructure planning. Similarly, schools' attempts to curtail student access to the internet are easily bypassed by technically knowledgeable students. Attempts by administrators at a New Hampshire private school to shut down internet access during designated study hours, for instance, were stymied. Students quickly figured out how to bypass the school's system and gain access to the web through other channels.

### Content Vetting

The web allows students to research points of interest, or to browse casually through different sites. While this practice may reflect positive constructivist learning, it may also result in classroom tension, depending on the context. A physics professor at a private school, for instance, was delighted that one of his students sent him a YouTube video of an exploding van. He incorporated it into the next day's lesson on electricity and conductivity. Another educator has come to depend on her students to keep her abreast of the New York theater developments.

Both of these examples pertain to information that was collected by students outside of school and brought to the educator for consideration. Devices such as laptops and smartphones – connected to the internet and enabled with robust search capabilities – have altered the long standing classroom dynamic of the educator as unquestioned expert and the student as passive knowledge consumer. Before, students had little recourse but to accept the knowledge imparted by their teacher as timely and accurate. The convergence of networks, devices, and curious students was still reported as relatively uncommon, but it is a practice which bears mentioning. One of our educators reports that a student challenged the content of her presentation and referred her to a website which presented contradicting information.

### Reinventing Homework

The popular concept of the term 'homework' conjures up a lone individual attempting to accomplish a set of assigned tasks with the support of some reference materials such as a book, a calculator, and, now, a computer. Third party support from a parent or tutor is acceptable, but allowing others to complete one's assignments is considered a form of cheating.

Thanks to easy student access to networked NDM devices in the formerly (relatively) distraction-free study space, the traditional concept of homework is largely a thing of the past. Our educator participants report that a majority of their students are online while they work at home to complete school assignments, either finding information on the web or collaborating or socializing with peers.

While this type of collaboration can constitute a positive example of collective intelligence in action, it contradicts the original intention of traditional assignments. In response, many educators have attempted to design homework assignments less amenable to collaboration. Others have dispensed with homework altogether. Our informants report that it is often clear from incomplete or incoherent assignments that students were interrupted mid-task and never returned to complete the project. Educators report that certain students can effectively multitask. Others, however, struggle with peer expectations that they always be available to chat versus adoption of a more appropriate, unnetworked, highly focused study strategy.

### 3. The Student-Student Relationship

Sorting out changes in the contemporary student-student relationship brought about by engagement with NDM tools poses a unique challenge, as NDM use is so ubiquitous that it has become a standard point for social contact.

Both the student-parent and student-educator relationships suggest a shift in power in students' favor, one facilitated in part by NDM affordances. The student-student relationship, however, has no such firmly set hierarchical structure. Adolescence is generally a period of engaging and experimenting with complex social realities such as status, popularity, and success, with social behaviors taking center stage. In the following analysis, we again rely on data collected from our educator participants to describe what has changed in the peer relations of their students, and NDM's possible involvement in these changes.

#### a. Changes in the student-student relationship

Most of the educators we spoke with insist that the basic desires of teens have remained essentially unchanged: they make friends and enemies, flirt, engage in romantic couplings and painful breakups. What has changed is the amount of time adolescents have to devote to peer relationships and recreational activities (see Section I). In the past, says a foreign language teacher from an elite prep school, there was much more unstructured time for students to talk and simply 'hang out.' While commuter students may live several towns away from their school-based friends, even boarding school students spend less time at dinner, less informal time with their instructors, and more time in their individual rooms.

The weekday schedule of a typical teen in our study consists of an early morning start and a commute to school (which could easily take longer than an hour), a full day of coursework and service learning work followed by hours of extracurricular activities such as the school play or a team sport. After dinner, there may be as much as five hours of homework awaiting the intrepid student before bedtime. Educators report that even commuter students, especially boys, are watching less TV than their students did five to ten years earlier.

#### b. NDM and the student-student relationship

Students use NDM tools in a variety of different ways ranging from schedule and relationship management to entertainment and escape. What appears to be unique to NDM-mediated engagements in comparison to those of earlier media are: a) their portability, with smartphones providing access to email, texting and the internet in most locations; b) their constancy, as users of the aforementioned phones enjoy uninterrupted access to their social networks online; c) their potential to support social spaces comprised only of peers and free of adult monitoring and rules; and d) their potentially anonymous nature, by which online contributors can bypass responsibility for their actions by operating under a pseudonym.

Youth are attracted to NDM engagements in part because they constitute escapes from adult constructions and real-world pressures – there is usually a peer to chat with or leave a message for online without interfering adults. For adolescents, however – especially girls negotiating the often rocky shoals of social relations – this powerful facilitator for hypersociality can become fraught with anxiety.

In the following section, we examine the data we collected from educators with respect to peer engagement with digital media.

### NDM as Efficiency Facilitator

Our educators report that students rely on digital media tools such as online calendars as an efficient way to manage their busy schedules. Several teachers mention that their students text or IM friends to make future plans for connecting either online or offline. Our data do not indicate what percentage of NDM exchanges between peers fall into this category relating to 'executive function.' Educators acknowledge that students have assumed more time management responsibilities that in the past were simpler and likely managed by a parent. NDM often play a large role in determining how adolescents interact with each other, especially online but also offline.

### NDM as Identity Performance

#### *NDM and Archived Performances*

A number of educators in our study mention that their students' engagement with sites such as Facebook and YouTube is as much about personal presentation and identity play as it is about communication. Most of our educator participants view engagement with social networking sites as a positive opportunity for adolescents to build a lifelong network of contacts and to grow through peer exchanges online. Students "love seeing themselves" on tape, and sites such as YouTube provide a forum for idiosyncratic youth culture to blossom. Similarly, the proliferation of NDM tools such as video recorders allow instructors to tape athletic and artistic performances both for posterity and to provide the basis for objective analysis of student performance.

Some educators share concerns around SNS practices. All this recording and archiving allow an adolescent to watch and analyze recorded versions of oneself, repeatedly if desired, and can foster a novel type of critical self-regard and reflections on self-presentation not seen before to this extent and frequency. Today's students try to appeal to their online audiences, and are also inclined to compare themselves to their peers. One educator observes an increase in the need for students to "know what others are doing." "Students see themselves in very stark ways," says a social science teacher in a NH boarding school. "They see themselves and others all the time, and in different aspects."

Managing one's online image is often a complex exercise, as the typical student struggles to strike the right balance calibrated to appeal to wide audiences. Students are "very concerned" about appearances, how they are perceived by others and fearful of making themselves vulnerable. A history teacher in an elite private school sees Facebook profiles as "image creations," for instance, and wonders how students actually experience themselves. A foreign language teacher working in an affluent Massachusetts public high school suggests that this sustained focus on the perceptions of an external audience may in fact delay a teenager from experiencing more authentic and personal developmental growth.

#### *NDM and Offline Performances*

Social behaviors around computers in public domestic spaces vary depending on the characteristics of the space itself. Boarding school students, for instance, enjoy both the company of peers and access to public lounges earmarked for casual youth engagements. In the past, these public spaces were frequent sites for indeterminate "hanging out" activities, sometimes with a housemaster, as well as television watching, offline gameplaying, and general horseplay. Contemporary students in boarding schools frequently cluster around the television to watch a video, a television program, or to play video games.

A video game or internet surfing session, along with a TV program or a movie, can often be found at the center of a gathering of adolescents. The media provide a welcome focal point and can help to diffuse potentially awkward social moments, often with same-sex peers. In the past, such moments were likely

mediated through television and movie viewing, as well as non-digital gameplay. To a certain extent, then, NDM as a social facilitator appears to mirror longstanding adolescent media use patterns. Social interactions online, however, appear to adhere to somewhat different rules of social engagement.

Student gamers, usually but not exclusively male, play at public computer stations and sometimes interact with each other. But it is more common for a player to focus intensely on the gameplay at hand and not converse with others in a sustained fashion. A student having a particularly successful gaming moment may develop an appreciative audience watching the proceedings. Students who spend time online surfing the web, conversely, are more often female, sharing with a friend, and discussing what they find.

Gameplayers and internet surfers often manifest markedly different social styles (Ito et al., 2008). Most schools have some computer resources onsite, the most common iterations being: a) laptops or desktop computers on carts wheeled to wherever they are needed; b) a dedicated computer room with several terminals primarily used for teaching; c) clusters of computers in a relatively public space, such as adjacent to the cafeteria; or d) a mix of the previous three options. One educator notes that the computers sited next to his school's cafeteria is a "social site, [a] place to observe and be observed."

### NDM as Social Buffer

As mentioned in the previous section, media participation can help ease frictions around potentially difficult social encounters between students and educators, and students and parents, such as how students often elect to email their teacher an important request to avoid "messy talks." Students utilize similar strategies to manage interactions with their peers.

### *NDM and Introverted Youth*

A few educators in our study report an increase in the number of students who appear to have fewer or no discernible social connections with their classmates or who shy away from face-to-face interactions with others altogether. While there may be many reasons for this development, a significant change facilitated by NDM is how students can retreat to their rooms alone but continue to engage with peers through online media. Online socializing may take the form of chatrooms, SNS sites, or (again primarily relevant for young men) video games that are played together online.

This type of online engagement is a common practice for both youth residing in boarding schools and those living at home physically distant from peers. It is also attractive to students who are less socially adept, with the media able to blunt or lessen the intensity engendered by direct face-to-face social engagement.

### *NDM and Managing Social Engagement*

Our educator participants note that their students often use NDM as a way to manage social contact. As one educator puts it, their "socialization is mediated by electronic devices." Students rely heavily upon sites such as MySpace and Facebook to communicate with their friends and to keep tabs on associates. In the past, there was no Facebook or MySpace, no 'online' space for adolescents to meet, no texting. Given the relative newness of the technology, it is stunning how fully integrated into teen life these tools have become. Again, determining causality is problematic, but in addition to juggling hectic schedules and keeping in touch with physically remote friends, students appear inclined to use NDM as a way to control the level of intimacy and intensity of their relationships. This practice in most instances does not eliminate the desire for face-to-face interaction; rather, it appears to insert a new step in the process of getting to know others. While our data did not capture online exchanges, one educator participant tells us

that young men and woman often push the boundaries of permissible flirting online, with exchanges quickly escalating in the disembodied, and seemingly distant, digital environment.

Offline, NDM provide ways to negotiate the terms of contact with those present. A common practice is that of a young person wearing headphones in a social setting, such as in a group of peers or during a group activity. An art teacher at an elite private school reports, “There used to be a boom box in the print room. Now it’s an individual environment. Most people listen to their iPod, and there’s less of a sense that ‘we’re all doing this together.’” Another fine arts educator says that her students come to the computer lab and immediately open an email client, iTunes, and Facebook. “You can perceive it as rude... they’re engaged in so many things secondary to your discipline.”

One educator tells of two groups of teens – one French, one American – participating in an exchange who were “so plugged they couldn’t communicate with each other.” The American students retreated to an isolated spot to “watch movies they’d already seen” or remain persistently connected to iPod devices. Relationships started emerging, she says, when the batteries started dying.

### *NDM as Obligatory Engagement*

Students today are linked to NDM tools such as social networking sites and to external devices which can help manage the level of engagement with others and with their surroundings, alleviating some of the unpleasantness of boring circumstances. However, the communicative power of NDM can also lead youth to overengagement. But to what extent are NDM elective at this point for the typical adolescent?

Adolescent girls are already developmentally inclined to engage in hypersocial activities. NDM communication tools can reinforce this tendency by eliminating the ability to distance oneself from one’s peers via the ability to connect constantly. Educators in our study report that girls engage in “persistent socializing” with NDM and are subjected to increased social pressures in part because of the potential to stay in contact with peers digitally at any time. A drama teacher at a small New Hampshire private boarding school notes that because of NDM, there are no longer any boundaries between ‘home’ and ‘school.’ “Social networking feeds into social pressures,” he says. “You can communicate anytime...if you make a social mistake you can make it better with more social work 24/7.” Others mention that the typical student receives social communications via NDM across multiple contexts – home, school, at night, at church, crossing the street. One educator calls the ubiquitous interruptions a “method of peer-driven social control.”

A number of teachers mention that the typical student needs to be online constantly, both to observe social interactions between other people and to monitor one’s own reputation from slanderous attacks. Cyberbullying, in particular, is a widespread problem related specifically to NDM’s facility at supporting anonymous postings, allowing around the clock contact, and enabling the participation of many colleagues with the click of a button. Bullying behavior appears to reach its apex at some point during junior high and declines thereafter, but still remains a part of high school social life (Merrell, Gueldner, Ross, & Isava, 2008). In the past, bullying may have occurred at school, but the student enjoyed a reprieve when in a different physical space. NDM, however, make it possible for bullies to access or ‘haunt’ their targets constantly. Similarly, most past instances of bullying were not anonymous and were in fact a way to assert one’s status, but NDM allow anyone to hide behind a pseudonym, harass the target and evade responsibility. Finally, bullying which may have been limited to a small cadre of perpetrators and victims can now spread more quickly and easily to a larger population. Many of our educators shared stories of such hostile peer-to-peer behavior.

One interesting dimension of NDM-facilitated cyberbullying is that it may include participants of significantly different age groups. One recent and well-known case of online, cross-generational bullying

in the Midwest ended tragically when a fifteen-year-old girl killed herself after the manipulations of a peer's mother (Smith, 2008). In our study group, one public school music educator recounts how a student in her school posted a photo and derogatory comments about a science teacher on MySpace. The student's identity was revealed, and she maintained her right to 'free speech.' The science teacher resigned at the end of the school year.

## C. MORAL AND ETHICAL PRIORITIES

Our educator participants tell us that their students' basic sense of moral and ethical priorities has not changed, which is to say that they remain a confounding mix of idealism, integrity, practicality, and greed, with a few ethical blind spots mixed in for good measure. What has changed is the capacity of students to articulate their concerns and participate in broader civic, social, and cultural endeavors for change. Whether they choose to speak up or act out, however, depends on a variety of factors.

Few of these changes demonstrate a strong or directly attributable correlation with NDM engagement. Nevertheless, the distinct nature of computer-mediated communication, in which two (or two hundred) people can communicate without sharing the same physical or temporal space, raise certain ethical concerns relating to issues such as privacy, credibility, ownership, and authorship (James et al., 2009). In the section below, we outline the moral and ethical characteristics cited by our educator participants and, where appropriate, outline possible affiliation with NDM. The practice of cheating, however, is one practice which has been significantly influenced by NDM.

### 1. Mental Models of Moral and Ethical Priorities

#### a. Changes in youths' moral and ethical mental models

##### Personal and Social Justice

Based on educators' descriptions, their students appear to have a finely honed sense of personal fairness, but possess a less consistent sense of fairness beyond their immediate environment. As mentioned in the earlier section outlining relevant environmental factors, most of the classrooms analyzed in our study employ a more constructivist, 'bottom-up' model of instruction in which students are active participants able to renegotiate the terms of their academic 'contracts.' In general, fairness for students means that classroom rules are transparent and applied consistently and fairly to them. "Students think about fairness in terms of 'how am I treated' by individual teachers... they want consistency and focus on actions," says a history teacher with over thirty years of experience.

Our educators tell us that there is a greater sense from students that they would like to make a positive difference in the world and yearn for meaningful public service. One teacher remarks that even though students are highly narcissistic, they still are concerned with issues around social justice. Others are hungry for engagement with something personally meaningful, want to 'change the world,' or are looking for a relevant link between their education and being a productive citizen.

The most popular causes cited by the students, as observed by their teachers, revolve around politics, the environment, and issues of diversity. The 2008 presidential election, in particular, captured the interest of our high school students after years of lack of interest, with the Obama candidacy galvanizing students' interest. In addition to politics, environmental issues were frequently mentioned as a concern for students. Educators tell us that diversity issues are also of enduring interest for students. They see their students as generally more respectful of each other and more tolerant of differences than their counterparts were in the past. According to our educator participants, schools are the primary drivers of this change, by teaching tolerance in specific educational initiatives, creating more tolerant environments, and allowing for more open dialogue on issues such as race.

##### Long-Term Goals

As mentioned earlier, the students described to us by our educator participants have to a large extent internalized the hopes and dreams of their parents – to a greater extent than did their predecessors. Our educators say that most students have decided in high school what they are going to do for the rest of their lives, and that these choices are influenced in large part by parental and peer pressures. Whether these stated choices are actualized once a student arrives at college is not known. While students who train for a particular career path during high school, such as musicians or dancers, are already engaging in their future profession, other students consider their high school experiences to be only a path into the college of choice and hold little relevance for the future.

According to our educator participants, the majority of their students plan on becoming highly compensated professionals like their parents. Despite an interest in public service and effecting change, and despite participating in service learning activities, a minority of students expresses an interest in actively pursuing such goals, and even fewer realize them.

#### b. NDM and changes in youth moral and ethical mental models

The rise in NDM-facilitated parental contact, explored in detail in an earlier section on student-parent social dynamics, is likely impacting youth's moral and ethical thinking as well as their short-term and longer-term personal goals.

One high school English teacher notes that students' political and social consciousness tends to ebb and flow in relation to external events. Most of our interviews were conducted in the wake of bank failures and the collapse of the financial markets, leading a number of educators to speculate on the financial and moral impact this might have on their students.

The volume and availability of information available to an internet-connected student affords access to both traditional informational outlets (newspapers, magazines) as well as a panoply of voices that are less accessible or excluded from these outlets. Now the curious can read about, for example, the Darfur genocide and even engage with peers from around the world on a regular basis. It bears noting that this type of engagement privileges the 'haves' over the 'have-nots': those interested in exploring other cultures likely have more opportunities to engage with peers in the Western world than peers living in poorer countries or in countries which restrict internet access.

## 2. Behavioral Changes

### a. Changes in youths' moral and ethical behaviors

With respect to models of fairness relating to social justice, student habits show inconsistencies between words and actions. Many students are hungry for a connection with something that feels large and 'important,' and express a sincere interest in participating in some type of volunteer work. Whether they achieve that connection is up for debate. A social science teacher tells us, "Students today have confused priorities and don't realize the contradictions," with individualistic, 'get-ahead' goals commingling with idealism and an orientation toward service. Similarly, many of the adolescents at our participating schools simultaneously "look more towards questions around the meaning of life, like religion, while.. looking on the computer to buy course papers."

While adolescent idealism is nothing new, part of what fuels this current expression is the sentiment that the world is in particularly bad shape. This sentiment appears to engender two opposing points of view: first, that the world is in very bad shape and needs assistance; second, that the world is in very bad shape,

is beyond salvaging, and that one's remaining time is best spent protecting one's own interests and enjoying oneself in the moment.

When youth in our schools engage in volunteer work, it is frequently through the vehicle of service learning. "Service learning," or required volunteer work conducted outside of school, was first introduced into most of our participant schools during the 1990s, and is usually a requirement for graduation. Types of service learning work can range from ladling soup for the homeless at a local soup kitchen to a multi-week trip to Romania to care for orphaned children.

Although we did not collect data on the volunteer rates of students outside of service learning initiatives, given the obligatory nature of service learning and the lack of free time in the typical student's day, it is likely that most volunteer work is done through the service learning system. In the best instances, service learning participation has the potential to satisfy the typical high school student's yearning for deep meaning and engagement in worthwhile causes. Often, however, service is seen by students as a way to pad their personal portfolios to appeal to college admission officers.

Despite reports that students are hungry for meaningful, real world engagement and the service learning universally required of students, a notable number of students are not invested in this type of work. While idealism and fatalism often coexist in adolescent mental models, several educators mention the impact of the events of 9/11 as coloring their students' worldview. Students are reported as seeing the world as more uncertain now, and themselves as more powerless to change conditions. They respond by drawing inward, focusing more on themselves and place a higher value on their family and closer peer relationships. "There's a greater apathy today," says one English and drama teacher. "There's more of a 'don't care' attitude, and less energy."

#### b. NDM and youths' moral and ethical behaviors

In theory, NDM empower youth to bypass adult systems and directly engage with individual passions, be it the environment or social justice or diversity. But educators in our study group report that most of their students do not utilize NDM to participate in volunteer activities online. When they do, as in the case of the student who created a website to solicit funds for his charity bike ride or the student who solicited donations for a cross-country bike trek, it is not clear to educators whether this was indicative of a genuine investment in a cause or an example of more resume padding, this time using internet tools.

While the internet offers multiple entry points for education and engagement related to social change for the interested student, it is unclear from our data whether youth in fact pursue such interests to a greater extent than they did in 1992. Given that we did not investigate the content of youth's NDM engagements, an in-depth discussion of the broader discourse over youth engagement online is beyond the scope of this study. One educator in our study wonders to what extent the ease of participating online is indicative of youth investment. "There's been an increase in online activism," she says, "but I wonder whether it's just an easy click or if that easy click leads to more political participation and empowerment, because they feel they've personally contributed." She reports that for a lot of kids, online activism is \$5 to Obama, and that to be able to contribute even a small amount of money is empowering.

### 3. Cheating

Our educator participants tell us that incidences of academic cheating have dramatically escalated in recent years. The current phenomenon of cheating is a 'perfect storm' of environmental pressures, shifting ethical norms, and the complications around negotiating and properly engaging with NDM-based

information. While students use NDM to cheat in a variety of ways – texting or photographing test questions to peers, for instance – we do not explore these mediated strategies in depth as they are relatively uncommon practices and are clear violations of ethical and procedural rules. Rather, this analysis focuses primarily on plagiarism, which has risen sharply as students gain access to online information (usually text-based) that can be seamlessly incorporated into an original work.

In the analysis below, we examine two major cultural shifts around cheating – an increased tolerance, even implicit support, for cheating behavior, as well as a redefinition of what constitutes cheating – and how NDM-based information inadvertently supports these shifts.

#### a. Changes in cheating over time

##### A Culture of Cheating

Most educators feel that cheating by their students is not an indicator of a broader moral decline. Rather, cheating reflects desperation in the face of the pressures to succeed felt by most students. Educators describe increased pressures for excellent academic performance as possibly driving additional students to consider cheating as a viable option – a way to ‘cut corners’ and to get ahead of the competition in an academic landscape where a B grade is no longer acceptable. The student most likely to cheat, according to our educators, is one who is struggling in a particular course and will likely cheat at the end of the academic term. “Students exercise poor judgment trying to get things done,” laments a fine arts instructor.

However, many of the educators that we spoke with describe a context and pressures that create unethical decisions by their students. With respect to cheating behaviors, it is true that some students have always cheated to some extent, but educators describe students taking greater risks, adopting a draconian “get by at all costs” attitude, and a greater tolerance for those who do cheat.

##### Shifting Definitions of Cheating

What some educators perceive as a greater tolerance for cheating behaviors, others see as a shift in what their students consider cheating. One educator identifies an increase in the “grey and greyer area” of distinction between “surfacey stuff” and outright plagiarism by his students. In other words, a ‘little’ plagiarism is seen as acceptable by his students, or not even identified as such. Another educator claims that behaviors that were once considered cheating may not be seen that way by students anymore, such as copying homework from another student. If caught, he says, they are not sorry. The same educator gives an example of a student who was caught cheating twice and subsequently lost his acceptance to Harvard. Similarly, students who “snatch a line or two” from someone else’s work, or download music without paying for it, shrug it off and dismiss charges of stealing or plagiarism. “Students aren’t sure what crosses the line between cheating and plagiarism,” says the director of an elite private school’s science department.

#### b. NDM and changes related to cheating

##### The Internet and Plagiarism

Students in the past had little capacity to access other people’s term papers or free copies of music. The internet and NDM allow users to access an enormous array of information, including articles, blog posts, and informal writing on virtually every subject (with internet content leaning toward more contemporary information and digitized forms). In addition, a number of sites offer study aids such as SparkNotes (the

modern day version of Cliff Notes), or term papers for sale. That the computer is both a portal to the internet and the platform for paper writing makes copying and pasting information from online sources into one's assignment extremely simple.

Part of the student confusion around plagiarism from online sources, according to our educators, stems from the fact that all the information they may need is online already, "there for the taking," with no barriers to access or fees charged. The internet "opens the door to plagiarism," says a high school history teacher. "It's so easy to do, just copy and paste," a college-level piano instructor reports. This educator reports seeing entire, unmodified excerpts from uncredited online sources appropriated and added into student work; the cleverer students know to lift text more discreetly, choosing smaller parts from a variety of sources and integrating them judiciously.

### Educator and Administration Responses

A chemistry teacher at a wealthy suburban Boston public high school is representative of our educator sample. He declines to indict students for plagiarist practices, and instead attributes the behavior to a "sign of the times," with so much at students' fingertips. At the same time, the institutions in our study are taking proactive steps to try to eliminate innocent misunderstandings related to fair use and proper attribution of sources through a variety of approaches.

While the internet provides students easy access to relevant course materials for appropriation, it provides the same comprehensive access to their teachers, as well. Many of the educators we spoke with report that their institutions utilize sophisticated software such as the one at Turnitin.com for detecting whether a suspect passage has an antecedent online. One educator says that his school encourages students to check their own papers for improper citations using Turnitin, allowing students to learn in advance of turning in an assignment how their teacher will interpret their submission. Other educators simply plug in suspect passages from a paper into an online search engine.

A popular approach for dealing with plagiarism issues is through group discussions around copyright issues, the definition of plagiarism, properly vetting internet sources, and general expectations with respect to honesty and ethical behavior in school. Yet, some educators perceive an uphill battle against the constant social pressures from parents and peers coupled with the 'free information' available online. "In the dorms, at the beginning of the school year, we have a discussion around trust, responsibility and good behaviors," reports a former dorm housemaster. "But now, there's a difficult culture where it's 'cooler' to do as little as possible and get away with it." Cribbing information from online for a paper can make a student both look, and feel, like the coolest kid in school.

As mentioned earlier, a student who is caught repeatedly plagiarizing material faces expulsion. One school, though, implements a penultimate fix – it deactivates the student's internet account online. But technological prohibitions have been proven to be ineffective solutions in an environment where students often possess more technical savvy than teachers or administrators. And if they do not already know how to bypass technological restrictions, they can look up detailed instructions online.

### III. CONCLUSION

In the body of this paper, we have illustrated the changes relating to youth habits around more standard interpretations of cognition, more socially situated types of cognition, and young people's moral and ethical priorities. We synthesize three key sets of takeaways that appear to be directly related to engagement with NDM:

- The extent to which the typical youth's cognitive capabilities are stretched by the demands of multitasking. We heard of students attempting to engage with multiple streams of information through NDM with mixed results. Some youths excel at multitasking, other peers struggle to emulate their successes. What is the capacity of the typical developing mind to absorb volumes of information, and what is the point when more information results in diminishing returns? Is multitasking a teachable skill and, if so, how can it be taught?
- The extent to which the typical youth utilizes NDM to self-assess and self-represent, through social networking sites (Facebook, MySpace) and sites which support amateur media productions (YouTube, DeviantArt) appear to be exacerbating the adolescent predilection for comparing one's appearance, popularity, and achievements against those of others. While our educator participants applaud the opportunities for youth to express themselves online, they express concern that these new forms facilitate quantitative analysis ("How many friends do I have?") as well as close, repeated scrutiny of one's externalized presentation ("How do I look?", "How do I behave?").
- The extent to which the typical youth is reliant on a wide and perhaps somewhat anonymous external network of support. Adolescents have traditionally been acutely aware of the opinions of friends and family. NDM reinvent one's informational network and explode one's social network, potentially including members who are remote in both physical proximity and relation. From the standpoint of a developing mind, we wonder if the traditional experience of adolescence as being a time of differentiation from one's parents may be impacted by NDM social network supports.

While not explicitly a result of NDM engagement, our findings also outline shifts toward the visual with respect to information acquisition, imagination and entertainment, the disjunction between academic goals and the means by which they are accomplished, and the decline in risk-taking and reflection in contemporary adolescents.

Reflecting on our and other investigations, we remain struck by the extent to which the once separate spheres of a young person's life now overlap. Competing streams of information from multiple NDM sources – iPod, cell phone, computer, GameBoy – strain the limits of the typical adolescent's capacity for sustained focus and thoughtful synthesis. Youth tend to divide their attentions between their online devices and the offline world they occupy, regardless of their novel and compelling real world situation (such as visits to remote nations or family triumphs or tragedies). We were told by our educator informants that youth today can – and do – listen to music, chat with friends, surf the internet, play video games, and work on original computer-based creations while engaged in any number of activities in the offline world such as going to school, hanging out with friends, eating dinner, watching TV, and the moments before they drift off to sleep.

While they work to juggle multiple streams of information, students are also negotiating their relationship with a corporeal space populated by objects, other people, and nature and delineated by culture, customs, and roles. In the battle to capture an adolescent's attention, online attractions frequently win.

The promise of NDM and mobile devices is that this overlap between multiple worlds has the potential itself to be synthesized; the skilled individual effortlessly summons a needed bit of information,

investigates both sides of a political argument, or collaborates on a project with a circle of trusted acquaintances, all while actively engaging in the offline world. This positive scenario remains an unrealized promise for most NDM users and for adolescents in particular, who are still developing their cognitive capabilities relating to discernment and making wise choices. NDM can be liberating and enlightening tools, or compulsive, absentminded responses.

While our findings engage with many intriguing points with respect to NDM and youth development, they by no means address all pertinent questions relating to this field. Indeed, our study prompts a host of associated questions, such as the need to emphasize different skills more suited to online engagement than to traditional book learning. For instance, the extent of reading's decline or change – its reach, characteristics, and reasons – remains open to debate. Does the increasing shift from print to screen require or shape different reading and writing skills than those traditionally developed? Similarly, comments from the educators we interviewed raise questions about the implications for envisioning and whether NDM provide prompts for a greater range of possibilities or else limit, even stifle, such possibilities.

As the internet's content continues to grow, one needs to be able to assess the credibility of online information and synthesize disparate elements, preferably quickly. Information in the NDM age also refers to data derived from one's social network, from gossip to job leads to news flashes. The often quotidian information which flows through social networks demands attention, but how much? Similarly, educators hint that students are less able to tolerate boredom than they were in the past. While boredom has consistently engendered a certain level of discomfort, it can be indicative of a need to probe more deeply into one's engagement with the world.

These shifts in youth habits may require a corresponding shift in pedagogical strategies. Some educators have already dispensed with homework, memorized formulas and multiple choice assessments, instead directing their energies toward the cultivation of metacognitive skills. It is likely that additional changes are required to ensure that appropriate educational strategies are employed for this emerging generation of digital citizens.

## References

- Beer, Jennifer S. and Kevin N. Oschner (2006). Social cognition: a multi-level analysis. *Brain Research* 1079: 98-105.
- Bradley, Karen (2005). Internet lives: social context and moral domain in adolescent development. *New Directions for Youth Development* 108, Winter 2005: 57-76.
- Finder, Alan (2008). Demographic dip may cool college-admission race. *New York Times*. March 9, 2008. ([http://www.dispatch.com/live/content/national\\_world/stories/2008/03/09/college\\_admissions\\_0309.ART\\_ART\\_03-09-08\\_A8\\_PQ9JA82.html?sid=101](http://www.dispatch.com/live/content/national_world/stories/2008/03/09/college_admissions_0309.ART_ART_03-09-08_A8_PQ9JA82.html?sid=101)).
- Gardner, Howard (2007). *Five Minds for the Future*. Boston: Harvard Business School Press.
- Geertz, Clifford (1977). *The Interpretation of Cultures*. New York: Basic Books.
- Ito, Mizuko, Heather A. Horst, Matteo Bittanti, danah boyd, Becky Herr-Stephenson, Patricia G. Lange, C.J. Pascoe, and Laura Robinson (with Sonja Baumer, Rachel Cody, Dilan Mahendran, Katynka Martínez, Dan Perkel, Christo Sims, and Lisa Tripp) (2008). *Living and Learning with New Media: Summary of Findings from the Digital Youth Project*. The John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning, November 2008.
- James, Carrie, with Katie Davis, Andrea Flores, John Francis, Lindsay Pettingill, Margaret Rundle, and Howard Gardner (2009). *Young People, Ethics, and the Digital Media: A Synthesis from the GoodPlay Project*. The John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning, October 2009.
- Jenkins, Henry, with Ravi Purushotma, Katherine Clinton, Margaret Weigel, and Alice Robison (2006). *Confronting the Challenges of Participatory Culture: Media Education for the 21st Century*. White paper for the MacArthur Foundation.
- Markus, Hazel (1985). The cognitive perspective in social psychology, in Lindzey & Aronson (Ed.s) *The Handbook of Social Psychology, 3rd Edition, Volume 1*(Chapter 4). Philadelphia, PA: Lawrence Erlbaum.
- Merrell, Kenneth W., Barbara A. Gueldner, Scott W. Ross, and Duane M. Isava (2008). How effective are school bullying intervention programs? A meta-analysis of intervention research. *School Psychology Quarterly*, 23, 26-42.
- Smith, Andrew D. (2007). Bedford mom sues Virgin Mobile over teen's photo in ad. *The Dallas Morning News*. September 21, 2007. ([http://www.dallasnews.com/sharedcontent/dws/bus/stories/DN-suevirgin\\_21bus.ART.State.Edition1.35bdb09.html](http://www.dallasnews.com/sharedcontent/dws/bus/stories/DN-suevirgin_21bus.ART.State.Edition1.35bdb09.html)).
- Strauss, Anselm and Juliet Corbin (1998). *Basics of Qualitative Research Techniques and Procedures for Developing Grounded Theory* (2nd edition). London: Sage Publications.

## APPENDIX A

### The GoodWork Project Informant Interview Protocol

#### I. Introduction/education

Thank you, etc. We'd like to just start by asking you some general questions about your teaching practices.

- a) How long have you been teaching? Have you changed schools? What age group(s) have you taught over the years? What age group(s) do you have the most experience with?
- b) Have you implemented changes in your teaching practice over time? If so, what's changed, and what brought about these changes? (Prompt for: self-study, formal study, professional development, school policies or administration, students).

#### II. Thoughts on observed change over time

We are currently speaking to experienced educators across a variety of fields to get a sense how the habits of minds -- behaviors, attitudes, skills -- of young people might be evolving from when you initially began teaching to the present. With respect to these interview questions, we are looking both for a general viewpoint of broader trends that you have witnessed, and for specific examples of students that you have worked with in the past or currently work with. In particular, we are looking to hear about students from throughout your teaching career -- both positively and negatively -- that typify the changes you've seen.

DEEP PROBES FOR STORIES, THEMES, THE UNEXPECTED/SURPRISING.

- c) In terms of your students' backgrounds, where do your students fall in terms of socioeconomic demographics? Has this changed over time? (for boarding school educators): Have you observed any changes in the student population and/or the reasons they attend?
- d) What are your impressions about what students do with their time outside of the classroom? What does the typical day look like for a student?
- e) **\*\*What types of cognitive skills do students come to school with today? What types of skills do they lack? (Probe for memory, attention, processing speed and multitasking, metacognition). What skills have you seen improve through formal training/school?**  
  
**\*\*What are students' primary sources of information? What do students do with information? (Probe for synthesizing or not, changes in process, and egs) (Probe for critical skills, issues of text & images).**

f) What types of tasks are students today more drawn to/not interested in/dislike?

**\*\* When do students take time with something? (conditions around process)**

**(Probe for interest around reading and/or writing, computer-based activities, individual vs collaborative work).**

g) **\*\*How do students today communicate with you/other adults/ one another? (Probe for: tone, content, approach, types of communications, tools utilized, quality of engagement, authenticity-transparency, bullying student/peer dynamics in classroom that educator notices).**

TIME CHECK. GOAL: +40

h) **\*What are your impressions about students' ethical and moral priorities? To what extent are students motivated by internal (ideals, dreams, fears) vs. external factors (family, money, media, etc?) Do they have models of what is fair/just/trustworthy? (probe for authenticity/transparency) How do these values manifest themselves (probe for political, civic, social action or lack thereof)? How honest are they overall?**

### III. Introduction/NDM

In the earlier set of questions, you told us a great deal about changes over time in students that you've seen. The next sets of questions more specifically deal with digital technologies such as cell phones, laptops, Google, Facebook, etc. Again, we are looking both for a general viewpoint of broader trends that you have witnessed, and for specific examples of students that you have worked with in the past or currently work with. In particular, we are looking to hear about students from throughout your teaching career who stand out -- both positively and negatively -- and that typify the relevant changes you've seen.

i) **\*\*What are your impressions about the types of digital technologies and activities your students currently engage with in school/outside of school? (Prompt for cellphone, video games [on and offline], etc).? What are the most popular digital technology activities that you've noticed? Who engages with them (prompt for gender, other markers)? Who is the most engaged? (Probe for students' engagement with the world, esp. re. possible NDM impact)**

**\*\*How important or not do online activities appear to be to students?**

**(depending on response – probe for more details re. time, level/type of engagement, etc. – to relate to GP findings on value accorded to online activities)**

j) What types of digital technology do you personally engage with? Do you have any favorites? (probe for favorite websites, tools, behaviors, etc).

### IV. Education, NDM and Development

We're interested in hearing more about your experiences as an educator as to how digital technologies may or may not impact student education and development.

- k) \*\*To what extent do you use digital media materials as part of your own teaching practice? Why or not?
- l) If **NDM in teaching practices**: Please describe a specific activity you've used successfully with your students. Which school-based digital technology activities are students the most adept with? The least? Which activities do they enjoy doing the most? The least? What are your impressions of the skills or competencies that digital technologies encourage? Discourage?
- m) \*\*What are your impressions of how digital technologies may or may not have an impact on how students think and/or behave? **If citing impact**: More specifically, what has changed? (probe for: assumptions around access, fact vs. argumentation, availability of information, extension of capacities, etc). Do certain tools encourage certain changes? In your opinion, do these changes in thinking/behavior seem temporary or permanent?
- n) Do you/Does your school have guidelines or rules pertaining to the use of digital devices? If so, what are they? When did this rule(s) get implemented? What was the thinking behind the rule(s)? (i.e. precautionary, cheating, distraction, etc.) Do you agree with these policies? If not, how would you change them?

## V. Summary

- o) Is there anything else you'd like to add? (Caution: may need to redirect)
- p) Could you put us in touch with someone else from your school/institution we could speak with about the school's technical resources?
- q) Could you put us in touch with any other Boston area educators that you consider to be outstanding and reflective practitioners in the fields of basketball, biology, history, piano, musical theater, and/or painting/drawing?

Thank you!

## APPENDIX B

### **The GoodWork Project Developing Minds and Digital Media Postsurvey**

Thank you for participating in the Developing Minds and Digital Media research study, conducted by Project Zero at the Harvard Graduate School of Education. As we mentioned prior to our interview, we are interested in your experiences as educators to assess possible changes in learning, education and development among young people over the past couple of decades.

In addition to your interview, we would like to ask you to answer just a few brief survey questions related more specifically to issues of digital technology. We appreciate your time in filling these out based on your observations. Thank you.

a. Do you or your school/supporting institution utilize digital media for education?

Yes \_\_\_\_ No \_\_\_\_

b. Approximately what year did you or your school/supporting institution start using digital technology?

\_\_\_\_ before 1992

\_\_\_\_ 1992 – 1995

\_\_\_\_ 1995 – 1999

\_\_\_\_ 2000 – 2002

\_\_\_\_ 2002 – 2004

\_\_\_\_ 2004 – 2007

\_\_\_\_ 2007 – 2008

\_\_\_\_ I don't/my school doesn't currently use digital technology but has plans to do so in the future

\_\_\_\_ I don't/my school doesn't currently use digital technology and has no plans to do so in the future

c. Approximately what year did you or your school/supporting institution first establish rules governing student use of digital technology?

before 1992

1992 – 1995

1995 – 1999

2000 – 2002

2002 – 2004

2004 – 2007

2007 – 2008

I don't/my school doesn't currently use digital technology but has plans to do so in the future

I don't/my school doesn't currently use digital technology and has no plans to do so in the future

d. Based on what you have observed, please rank the top six activities your students engage with in school, starting with "1" for the most popular activity, "2" for the second-most popular activity, etc.

Using social networking sites (Facebook, MySpace, etc)

Playing online games (World of Warcraft, Club Penguin, etc)

Playing offline games

Playing educational games (Oregon Trail, etc).

Using computer-based tutorials or trainers

Creating or contributing to online blogs, wikis, or other online forums

Creating and/or uploading video or movies

Creating and/or uploading audio or music

Text Messaging

Downloading creative content (Music/TV/Movie, etc)

Reading/Watching online content

Using the internet to conduct research

Collaborating online

Other (please specify) \_\_\_\_\_

e. Based on what you have observed, please rank the top six online activities your students engage with outside of school, starting with "1" for the most popular activity, "2" for the second-most popular activity, etc :

- \_\_\_ Using social networking sites (Facebook, MySpace, etc)
- \_\_\_ Playing online games (WoW, Club Penguin, etc)
- \_\_\_ Playing offline games
- \_\_\_ Playing educational games (Oregon Trail, etc).
- \_\_\_ Using computer-based tutorials or trainers
- \_\_\_ Creating or contributing to online blogs, wikis, or other online forums
- \_\_\_ Creating and/or uploading video or movies
- \_\_\_ Creating and/or uploading audio or music
- \_\_\_ Text Messaging
- \_\_\_ Downloading creative content (Music/TV/Movie, etc)
- \_\_\_ Reading/Watching online content
- \_\_\_ Using the internet to conduct research
- \_\_\_ Collaborating online
- \_\_\_ Hiking/Camping/other nature-based recreation
- \_\_\_ Shopping
- \_\_\_ Socializing with friends
- \_\_\_ Socializing with family
- \_\_\_ Political/community participation/service
- \_\_\_ Extracurricular academic activities (elective classes, science club, 4H, etc.)
- \_\_\_ Playing musical instruments
- \_\_\_ Participating in offline sports/collective games
- \_\_\_ Writing fiction/non-fiction offline
- \_\_\_ Writing fan fiction offline
- \_\_\_ Reading/listening to music offline
- \_\_\_ Participating in organized group activities (Boy Scouts, YWCA, church or youth group, etc)
- \_\_\_ I don't know
- \_\_\_ Other (please specify) \_\_\_\_\_

f. Please rank the top six activities you yourself engage with, starting with "1" for the most popular activity, "2" for the second-most popular activity, etc.:

- Using social networking sites (Facebook, MySpace, etc)
- Playing online games (WoW, Club Penguin, etc)
- Playing offline games
- Playing educational games (Oregon Trail, etc).
- Using computer-based tutorials or trainers
- Creating or contributing to online blogs, wikis, or other online forums
- Creating and/or uploading video or movies
- Creating and/or uploading audio or music
- Text Messaging
- Downloading creative content (Music/TV/Movie, etc)
- Reading/Watching online content
- Using the internet to conduct research
- Collaborating online
- I don't use digital technology
- Other (please specify) \_\_\_\_\_

g. Please indicate the median average household income for your students:

- under \$35K
- \$35K to \$75K
- \$75K to \$100K
- \$100K to \$150K
- \$150K to \$350K
- above \$350K

Thank you for completing this survey and for contributing your time, effort and expertise to helping us learn how students' learning has changed over time. For additional information and updates on this project and other projects being conducted by the GoodWork project at Harvard University, please go to <http://www.goodworkproject.org/> or contact Margaret Weigel, Project Manager, at 617-XXX-XXXX or [margaret\\_weigel@pz.harvard.edu](mailto:margaret_weigel@pz.harvard.edu).

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<sup>1</sup> The first phase of the Developing Minds and Digital Media (DM2) study was funded by a generous grant from Judy Dimon, and investigated possible links between cognitive changes over time and new digital media as manifested in a high school aged population. Literature reviews, paper writing, qualitative research and data analyses were completed between June 1, 2007 and May 31, 2009.