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Measuring New Media Literacies: Towards the Development of a Comprehensive Assessment Tool

Ioana Literat

Annenberg School for Communication and Journalism, University of Southern California, Los Angeles, CA, USA

Abstract

This study assesses the psychometric properties of a newly tested self-report assessment tool for media literacy, based on the twelve new media literacy skills (NMLs) developed by Jenkins et al. (2006). The sample (N=327) consisted of normal volunteers who completed a comprehensive online survey that measured their NML skills, media exposure, digital participation, and civic engagement. A factor analysis performed on the survey items yielded 10 NMLs that emerged as significant subscales. A series of multivariate analyses of variance indicate a strong relationship between these NMLs and respondents' exposure to new media forms, their participation in Web 2.0 platforms, and their civic engagement. Specifically, individuals who consume and produce new media extensively had the highest NML levels; Facebook, Twitter, YouTube and blogging emerged as the most significant factors in this analysis. The reliability and scalability of this assessment tool are discussed, in the context of current challenges facing media literacy evaluation.

Keywords*: new media literacies (NMLs), media literacy, media literacy assessment, Henry Jenkins, survey construction*

To successfully navigate today's data-rich and complex media environment, the ability to effectively find and evaluate necessary information is key. In order to function as critical consumers, it is imperative to be aware of the various types of bias inherent in specific media sources and communication channels (Covington 2004). Nonetheless, one must be more than an adept media consumer. The proliferation of Web 2.0 platforms and new communication technologies is gradually turning consumers into producers, and an active and proficient involvement in the original crafting and dissemination of media messages is becoming a defining characteristic for today's successful media users. Considering the novel skills that are required for a full participation in today's communication environment, the concept of media literacy becomes an increasingly valuable asset, and an important prerequisite to both critical media consumption and responsible media production. A highly multifaceted and often debated term, media literacy is generally defined as "the ability to access, understand and create communications in a variety of contexts" (Buckingham 2005), and refers to both traditional media channels (television, radio, print media) and new media, such as the Internet, mobile telephony and video games.

Buckingham (2005) is right in noting that, just like print literacy, media literacy "should not be seen as a purely cognitive, rational affair: it also involves emotional response, enjoyment and cultural appreciation." However, this type of engagement is often overlooked in media literacy theory. Furthermore, the traditional understanding of the concept does not always account for the active production of original media. In fact, in terms of net impact, creative media production has been shown to account for higher levels of media literacy than consumption-based practices (Phang and Schaefer 2009). This is not a surprising finding, given that, from a cognitive perspective, an increased participatory involvement facilitates deeper learning and stimulates critical thinking (Blumenfeld, Kempler and Krajcik 2006).

But what exactly are these necessary media literacy skills? In their influential White Paper for the MacArthur Foundation, "Confronting the Challenges of Participatory Culture: Media Education in the 21st Century," Jenkins et al (2006) make a critical theoretical contribution by identifying twelve "new media literacies" (NMLs) that are necessary for a full participation in today's media environment. These skills are: play, performance, simulation, appropriation, multitasking, distributed cognition, collective intelligence, judgment, transmedia navigation, networking, negotiation, and visualization (Jenkins et al. 2006). The NML framework differs from previous media literacy models

in that it envisions people as active participants in the new digital environment; their role is reconfigured to account not only for media consumption, but for active media creation as well. Furthermore, in Jenkins' view, these NMLs are "social and cultural competencies" that go beyond access to technology and proficiency with different media platforms; rather, they are conceived as critical skill sets that are bred and enhanced by one's digital involvement in a participatory culture.

A review of the literature in the field of media literacy points to the lack of an appropriate measurement tool to assess these new media literacy skills, especially among youth (Buckingham 2005). Certainly, existing tools do not capture the full spectrum of skills and propensities suggested by Jenkins et al. (2006). With increasing urgency, researchers and educators alike have pointed to the need to create national standards of media literacy assessment (Scharrer 2003; Potter 2004), which would provide empirical bases for evaluating the relationships between media literacy and digital participation, and for facilitating future media literacy interventions.

Within the context of methodology development, the notion of media literacy is oftentimes employed in an arguably limited fashion, to refer principally to people's critical understanding or processing of media messages, while overlooking their creation of media. Thus, the few studies that attempt a practical assessment of media literacy skills have consisted of measuring exclusively the ability to understand written and audiovisual texts (Dorr, Graves and Phelps 1980; Quin and McMahon 1995; Phang and Schaefer 2009). Beyond the limited conceptual scope of such undertakings, these studies also point to the problematic nature of quantifying critical comprehension, given that such assessments are "implicitly normative" and favor specific readings of media messages as correct and "socially validated" (Buckingham 2005). Rosenbaum (2007) attempts the most ambitious and comprehensive effort to establish a standardized media literacy quantitative assessment tool, yet her instrument does not include any questions related to respondents' production or dissemination of digital media, which is a major conceptual gap. Furthermore, her suggested assessment questions place a strong emphasis on the comprehension and interpretation of news programming, at the expense of other social and cultural practices of media consumption and production.

Previous attempts to assess media literacy have mostly been centered on self-reported measures, due to the difficulty of experimentally gauging media literacy levels across different platforms and various media content. Furthermore, the reliance on qualitative data – which is typical of most studies in this field – means that such assessment projects are not feasibly replicable with larger groups (Rosenbaum 2007). In addition, in terms of empirical scope, most evaluative research in this field is concerned with assessing the effectiveness of various media literacy programs, especially in educational settings (Gonzales, Glik and Davoudi 2004; Hobbs and Frost 2003; Phang and Schaefer 2009), and there has been little effort to quantify media literacy at baseline levels prior to media literacy program onset (Rosenbaum 2007). Additionally, due to the predominantly educational applications of media literacy programs, assessment projects have failed to measure media literacy levels across non-youth, in addition to youth, populations (Maness 2004; Brown 1991).

The present study aims to address these methodological lacunae by developing and validating a comprehensive assessment tool that could be used to measure new media literacies (NMLs) in both adult and juvenile populations. Built around the twelve NML skills identified by Jenkins et al. (2006), this questionnaire assumes a multi-component understanding of media literacy, tackling both the consumption of media messages, as well as the original creation of multimedia material. The items on the questionnaire have carefully been crafted to address both online and offline behaviors, in accordance to the NML framework, which views new media literacies as social and cultural skill sets.

In assessing the psychometric properties of this new assessment tool, survey data will first be factor analyzed and an assessment of the reliability of the measure will be made. We will compare these factors with Jenkins' original 12 NML skills and discuss the overlaps and differences. Then, to provide an initial assessment of validity, the scale(s) will be correlated with several variables that media literacy should predict, such as one's degree of digital participation, the amount of time spent with different forms of media, or the extent to which users engage in creative multimedia projects. Finally, we will also perform an exploratory analysis of the impact of various demographic factors on the components of media literacy, as they emerge from the factor analysis.

If the survey instrument is accurately constructed, we expect to see 12 separate subscales – similar to the 12 NMLs identified by Jenkins et al. (2006) – resulting from the factor analysis. In terms of the relationship between media exposure and NMLs, we hypothesize that higher levels of new media literacies will predict a higher degree of engagement with media forms – particularly new digital media – and that there will therefore be a significant difference in NMLs between people with low versus high levels of media exposure. An increased degree of digital participation in various Web 2.0 platforms should also relate to high NML levels, with light users scoring lower in media literacy than heavy users of these digital platforms. We also hypothesize that high NML levels should predict a greater propensity for multimedia creation, and, respectively, civic engagement. Finally, in terms of demographic differences, we expect young, educated and relatively wealthier demographic groups to show higher NML skills than users that are older, less educated, or from lower socio-economic strata.

Methods

Sample

The sample for this study (N=327) was a convenience sample of normal volunteers over the age of 18. In terms of gender distribution, the sample contained 131 male respondents and 187 female respondents. The average age was 33.7 years (SD=11.7). In regards to ethnicity, 83.9% of respondents were white, and 77.3% indicated English as their primary language. Income and education levels were normally distributed.

Recruitment

The questionnaire was made available on the Qualtrics website, and the link was distributed via email and social networking sites, primarily Twitter and Facebook. There were no material incentives for taking part in this study; however, to maximize participation, the questionnaire was designed as a fun personality quiz, and users received their personalized media literacy score at the end of the survey, as well as a description of the type of media user they were, based on their responses to the questionnaire.

Survey Design

The survey (see Appendix A) was structured around 4 main sections: demographics, media use habits, new media literacies (NMLs), and civic engagement. None of the questions on the survey were mandatory, and respondents could choose to skip any question. To maximize the validity of the findings, the order of the questions within each section was randomized, so that each participant received them in a different order.

The third and most crucial section aimed to assess respondents' new media literacy skills (NMLs) by presenting them with a randomized series of 60 statements about their personality, social and cultural modes of engagement, online and offline peer interaction, learning styles, and media consumption and creation patterns. The statements were conceptually built around the 12 NML skills identified by Jenkins et al. (2006). These are:

- Play — the capacity to experiment with one's surroundings as a form of problem-solving
- Performance — the ability to adopt alternative identities for the purpose of improvisation and discovery
- Simulation — the ability to interpret and construct dynamic models of real-world processes
- Appropriation — the ability to meaningfully sample and remix media content
- Multitasking — the ability to scan one's environment and shift focus as needed to salient details
- Distributed Cognition — the ability to interact meaningfully with tools that expand mental capacities
- Collective Intelligence — the ability to pool knowledge and compare notes with others toward a common goal
- Judgment — the ability to evaluate the reliability and credibility of different information sources
- Transmedia Navigation — the ability to follow the flow of stories and information across multiple modalities
- Networking — the ability to search for, synthesize, and disseminate information
- Negotiation — the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms
- Visualization – the ability to create and understand visual representations of information.

To ensure an adequate factor analysis while

minimizing the duration of the survey, we decided to include 5 statements for each NML, for a total of 60 questions. These statements addressed both technology-related and non-technology-related behaviors, in accordance with our view that the NML skills are social and cultural competencies that stretch beyond media expertise or technological capability. The questions were assessed on a 5-point Likert-type scale (1=Strongly Disagree, 5=Strongly Agree). For a full list of the statements used in the questionnaire, please see Appendix A.

Results

New Media Literacies (NMLs) Scale: Factor Analysis and Subscale Reliability

Although all of our scale items collectively attempt to measure new media literacy levels, and the overall reliability of the scale is high (Cronbach's α=.903), we were interested in identifying the specific subcomponents that make up this concept. Our initial research question was whether the subscales of this survey instrument map well onto Jenkins' 12 NMLs. Specifically, we were interested in seeing if, as predicted, the scale would break down into components that were similar to those identified by Jenkins et al. (2006). To address this question, we performed a factor analysis on the 60 items, and then assessed the reliability of each separate subscale that emerged from the factor analysis.

The Kaiser-Meyer-Olkin test of sampling adequacy was .824, much above the recommended value of .6, and Bartlett's test of sphericity was significant at 5,325 ($p < .001$), which means that the items are appropriate for factor analysis. We therefore performed a principal component factor analysis, using the Varimax method of rotation with Kaiser normalization. To simplify the results of the analysis, we decided to suppress items whose coefficient was below 0.5. The factor analysis performed in SPSS yielded 17 factors with an eigenvalue above 1.00; these accounted for 61% of the variance. In descending order by variance, the subscales that emerged were: negotiation, networking, judgment, play, multitasking, appropriation, transmedia navigation, visualization, distributed cognition, and performance. The reliability of all subscales was found to be satisfactory.

In conclusion, out of the 12 NML skills that Jenkins identified as the competencies of media literacy, 10 were identified in the factor analysis of our scale. This is a rather impressive and encouraging finding, especially given the fact that all 60 items of the scale were completely randomized and thus the items that made up each of these 12 subscales never appeared in order. The two NMLs that did not distinctly emerged from the factor analysis were collective intelligence and, respectively, simulation; rather than clustering together as distinct factor components, the items measuring these two dimensions ended up being spread out over the different subscales.

Relationship between Media Use and NMLs

Once the factor analysis revealed the various new media literacy skills (NMLs) that the scale constituted of, we proceeded to explore the relationship between these NMLs and patterns of media exposure and digital participation. NML subscale composites were formed by calculating the aggregate mean of their constituent items. We thus computed 10 new variables, which represented the specific factors that emerged as a result of the factor analysis: negotiation, networking, judgment, play, multitasking, appropriation, transmedia navigation, visualization, distributed cognition, and performance.

Media Exposure

To be able to see the variations in NML skills across different groups, depending on the intensity of users' exposure to media, we ran multivariate analyses of variance (MANOVAs). For the purpose of facilitating the analysis, in this and subsequent MANOVA tests, respondents were dichotomized into two groups, using a median split. The condition of belonging to one of these two groups (low or high media use, light or heavy digital participation) was used as the dependent variable in the MANOVAs, while the 10 NMLs were considered as independent variables.

We first looked at respondents' cumulative media exposure, which included time spent with all forms of media: Internet, television, print media, and videogames. According to our second hypothesis, we expected to see a significant difference in NML skills between high and low media users.

The multivariate difference in media literacy levels assessed using MANOVA was indeed significant: $F(10, 316)= 3.025$, $p=.001$, with avid media consumers

scoring higher across all NML skills (M=3.878, SD=.382) than less enthusiastic media consumers (M=3.694, SD=.397). The univariate differences between the high and low media exposure groups were particularly pronounced in the areas of negotiation (F(1, 325)=7.130, p=.008), networking (F(1, 325)=12.058, p=.001), appropriation (F(1, 325)=7.220, p=.008), play (F(1, 325)=7.167, p=.008), multitasking (F(1, 325)=14.923, p<.001), and transmedia navigation (F(1, 325)=10.403, p=.001).

Next, we explored the relationship between NMLs and exposure to specific media. In terms of Internet use, there was a significant difference in media literacy, examining the multivariate effect between low and high users: F(10, 316)= 3.171, p=.001, with the most striking contrast occurring in terms of networking skills. Due to the interconnecting and socializing features of the Internet, less enthusiastic Internet users scored much lower in networking skills (M=3.859, SD=.654) than frequent users (M=4.201, SD=.546). For videogames, the difference between frequent and infrequent users was also significant (F(1, 316)=2.811, p=.002), with avid gamers scoring substantially higher (M=4.143, SD=.576) than their peers (M=3.875, SD=.601) in the domain of play, or experimental problem-solving (F(1, 325)=17.019, p<.001) (Table 1).

Dependent variable	F-Value	Most significant NMLs
Media exposure (cumulative)	F(10, 316) = 3.025, p=.001	negotiation, networking, appropriation, play, multitasking, transmedia navigation
Internet	F(10, 316) = 3.171, p=.001	networking
Videogames	F(1, 316) = 2.811, p=.002	play

Table 1. Significant effects for media exposure

Our questionnaire addressed users' exposure to four different forms of media: two new ones (Internet and videogames) and two old ones (television and print media). Interestingly enough, while the difference between light and heavy users of the Internet and videogames – i.e. new media – was substantial (F(10, 316)= 3.171, p=.001 for Internet, and, respectively, F(1, 316)=2.811, p=.002 for videogames), this difference was not significant in the case of traditional media: for television, F(10, 316)=1.516, p=.132, while for print media, F(10, 316)=1.285, p=.238.

Digital Participation

The second half of this section sought to quantify respondents' level of digital participation and engagement with online platforms. According to our hypothesis, we expected to see a significant difference between high and low digital participation levels, with highly engaged users showing higher NML skills than less avid digital participants.

Before proceeding to investigate the relationship between media literacy and specific Web 2.0 platforms (e.g. Facebook, Twitter, YouTube, blogging, etc), we first performed a general MANOVA, using respondents' cumulative digital participation reports – split along the median into light and heavy users – as our independent variable. The difference in NMLs between these two groups (users with high digital participation levels versus those with lower participation levels) was indeed significant; thus, across all platforms, F(10, 316)=3.172, p=.001 (Table 2).

A high degree of engagement with Facebook correlated strongly with high media literacy levels. With Facebook use – high or low – as our independent variable and the NMLs as our dependent variables, we performed a MANOVA and found that the difference between light Facebook users (including non-users) and heavy users was significant: F(10, 316)=5.294, p<.001. A subsequent univariate analysis revealed that the most pronounced differences in NMLs for infrequent versus frequent Facebook users appeared, not surprisingly, in the areas of networking (F(1, 325)=31.527, p<.001).

Twitter also emerged as having a significant relation to NML skills. The multivariate difference between light (which, again, includes non-users) and heavy Twitter users was considerable: F(10, 316)=3.181, p=.001. In terms of the specific NMLs, we found that light Twitter users scored lower in networking (F(1, 325)=26.908, p<.001) and transmedia navigation skills (F(1, 325)=9.128, p=.003) than more enthusiastic tweeters.

The next consequential independent variable that we examined was YouTube; specifically, we were interested in whether light and heavy users of YouTube differed in NML levels, and if so, in what particular NML skills. Our MANOVA pointed to a

significant difference between light and heavy YouTube users: F(10, 316)=4.553, p<.001. The NMLs that YouTube fans excelled at were appropriation (F(1, 325)=22.009, p<.001) and transmedia navigation (F(1, 325)=20.352, p<.001), but also, to a less astounding degree, performance (F(1, 325)=15.845, p<.001) and negotiation (F(1, 325)=11.978, p=.001).

Finally, blogging emerged as another particularly important platform in terms of NML skills. With blogging as our independent variable, and the NMLs as our dependent variables, we found a significant difference in NML skills between bloggers and non-bloggers: F(10, 316)=4.747, p<.001. Individuals who keep a blog scored much higher in appropriation (F(1, 325)=27.681, p<.001) and networking skills (F(1, 325)=27.409, p<.001).

Dependent variable	F-Value	Most significant NMLs
Digital participation (cumulative)	F(10, 316)=3.172, p=.001	appropriation, networking, transmedia navigation
Facebook	F(10, 316)=5.294, p<.001	networking
Twitter	F(10, 316)=3.181, p=.001	networking, transmedia navigation
YouTube	F(10, 316)=4.553, p<.001	appropriation, transmedia navigation, performance, negotiation
blogging	F(10, 316)=4.747, p<.001	appropriation, networking
creating media projects	F(10, 315)=6.635, p<.001	appropriation

Table 2. Significant effects for digital participation

While Facebook, Twitter, YouTube and blogging displayed the strongest connections to NML skills, we also found marginally significant differences between users and non-users of other social networking sites (such as Bebo, Friendster, or My Space), message boards, and online games. The data we collected for online group membership, multiplayer gaming and, respectively, podcasting, was not sufficient to allow us to explore the differences between groups of users and non-users.

Finally, since creative ability is an inseparable part of media literacy – as discussed in the initial section of this paper – we also tested for the significance of the relationship between NMLs and multimedia creation. Indeed, as hypothesized, there was a strong difference between respondents who reported creating multimedia projects often and those who admitted engaging in such projects only rarely: F(10, 315)=6.635, p<.001. Not surprisingly, the top NML skill that made the difference here was appropriation (F(1, 324)=46.553, p<.001); frequent multimedia creators scored much higher in appropriation levels (M=3.915, SD=.758) than less enthusiastic producers (M=3.327, SD=.795).

Civic Engagement

In addition, because all of the affiliations above are online or computer-based, we also included the element of civic engagement as an alternative, offline type of affiliation. As predicted in our hypothesis, respondents with high civic engagement levels had higher NML skills than those with low civic engagement levels; the difference was significant (F(10, 313)=3.516, p<.001), with networking, play and judgment emerging as important NMLs in this area (Table 3).

Demographics

Next, we examined whether individuals differing in gender, education and income varied in NML skills. Indeed, using MANOVA, we found that the NML skills of men and women differed to a significant extent: F(10, 307)=3.793, p<.001, with the statistically significant univariates occurring in the areas of play, transmedia navigation, and performance. Men proved to be better at play (F(1, 316)=8.250, p=.004) and performance (F(1, 316)=5.671, p=.018), while women excelled at transmedia navigation (F(1, 316)=7.167, p=.008). We also found that education and income had an effect on NML levels: F(10, 315)=2.411, p=.009 for education and, respectively, F(10, 310)=2.031, p=.03 for income. In terms of the specific NMLs involved, we found that less educated people proved more adept at multitasking (F(1, 324)=6.191, p=.013), while more educated respondents showed higher levels of distributed cognition (F(1, 324)=6.505, p=.011). Interestingly, contrary to what we had expected, age did not make a significant difference in NML skills: F(10,301)=1.644, p=.094.

Discussion

Summary of Findings

The study was designed to test the validity of a newly developed survey instrument measuring new media literacies (NMLs), in accordance to the theoretical framework proposed by Jenkins et al. (2006), as well as to explore the connections between individuals' NML levels and their degree of media exposure, digital participation, and civic engagement. Our first hypothesis was that the survey instrument would be able to be broken down into separate components similar to the 12 NMLs identified by Jenkins. Indeed, in the current work, we found that the media literacy measure, when factor analyzed, almost fully mapped onto Jenkins' classification of NMLs: 10 of the NMLs emerged as distinct components in the factor analysis, with only 2 NMLs failing to appear as significant subscales in the survey. Furthermore, we found that each of these subscales had adequate reliability.

In line with the second hypothesis, we found that higher levels of new media literacy skills indeed predicted an increased degree of exposure to media; however, this was only true of new media (Internet and videogames), and not traditional media (television and print media) as well. This is an interesting conclusion, which supports the view that new digital media, due to their interactive and highly socializing nature, are more adept at breeding the social and cultural competencies needed for a full participation in today's digital environment than traditional media, which are inherently more passive (Jenkins et al., 2006).

In terms of digital participation, we hypothesized that higher levels of media literacy should predict a higher degree of engagement with Web 2.0 platforms, as well as an increased propensity for multimedia creation. This hypothesis was fully supported. Out of the digital platforms we explored in this study, the ones that emerged as particularly significant in this analysis were Facebook, Twitter, YouTube, and blogging. For Facebook, the difference between light and heavy users was especially pronounced in the area of networking, with enthusiastic Facebook users displaying extremely high networking skills. This result is unsurprising, given the function of Facebook as a social networking site, but this connection is important in regards to the applicability of such online-learned skills in the context of one's offline behavior. For Twitter, the two main NMLs where light and heavy users significantly differed were networking and transmedia navigation; this conclusion makes sense, and can be explained by the hyperlinked and social nature of the Twitter platform. YouTube also emerged as an extremely significant platform in terms of NML skills, with the main differences between light and heavy users occurring in the areas of appropriation, transmedia navigation, performance, and negotiation. These results are most likely explained by the primary functions of the YouTube platform as a crucial depository of popular culture clips (to be used in appropriation processes), a source of multimedia information (encouraging transmedia navigation), a democratic limelight for stardom and personal opinion (performance) and a transnational hub that facilitates intercultural learning (negotiation). For blogging, the NMLs that made the most significant difference between bloggers and non-bloggers were appropriation and networking. Most likely, this is due to the increasingly interlinked nature of the "blogosphere", with writers linking to other blogs of interest, keeping a blogroll on their personal page, republishing relevant posts, etc. This process of hyperlinked interconnectedness, while gradually transforming the personalized "blogosphere" into one global community, increasingly requires networking and appropriation skills that allow one to most effectively tap into this informal community.

The results of this study also supported the connection between multimedia creation and media literacy; as hypothesized, higher NML levels predicted a propensity for multimedia creation, and the difference between frequent and infrequent digital creators was extremely significant. This is in line with the literature in the field, which claims that the ability to creatively produce and distribute multimedia texts should correlate strongly with higher levels of media literacy (Phang and Schaefer 2009).

Similarly, the results also confirm the connection between new media literacies and civic engagement, which is emerging as a critical application of NML educational initiatives (Rheingold 2008). Our hypothesis regarding the positive relation between media literacy and civic engagement was fully supported, with respondents that scored highly across the NMLs showing much higher degrees of civic engagement than their less media literate peers.

Finally, in terms of demographic differences, our hypothesis was partially supported. While education and socioeconomic status did make a difference in terms of NML skills, the level of significance here was

not as high as we had expected. Age, on the other hand, which we had predicted to be a crucial independent variable in our analysis, did not emerge as a significant factor. While this finding is certainly at odds with the general perspective of the field (Buckingham 2005) – and especially since the present survey included a large variety of youth culture questions – perhaps the lack of significance can be explained by the fact that the older people that took this survey were recruited principally through professional (academic) relationships, which meant that they are highly connected to the field of media and communication because of their education, interests, or professional experience.

In conclusion, as evidenced by the support for our main conceptual hypothesis, the data gathered in this study will be instrumental in perfecting a validated quantitative assessment tool to complement NML initiatives built around this particular framework. So far, educational endeavors aimed at cultivating these skills were generally assessed using qualitative evaluation tools, which are inherently unfit for use with large samples, and are much harder to implement due to logistical considerations. We therefore hope that this questionnaire, especially used as a baseline measure of new media literacies, will help provide a more accurate and comprehensive picture of individuals' abilities in this domain.

Furthermore, the study provided critical information about the connections between new media literacies (NMLs), media exposure, and engagement with different Web 2.0 platforms; this represented a much-needed addition to the literature on media education, which so far did not address these specific correlations. In terms of the validity of the present assessment tool, the fact that our hypotheses regarding the connection between media literacy and media use habits were strongly supported lends additional predictive validity to this survey instrument. This is a highly significant conclusion that adds further import to the current study. While the causal relationships between these variables would need to be examined longitudinally, over time, it is our interpretation that the relationship between media use and media literacy is a circular one, involving a virtuous feedback loop: for instance, while extensive use of the Internet raises one's media literacy levels, media literate individuals are also more likely to access the internet considerably more.

Limitations

A major shortcoming of the present study concerns the recruitment of the sample used. Specifically, subjects were recruited through email, Facebook, Twitter and other social networking sites, which implies an inherent bias towards individuals that already have a certain degree of media literacy. Furthermore, due to the personal connections of the author, some of the respondents are part of the academic community – many of them studying media or communication – which also means that they are considerably more media literate than the general population.

The content of the survey can also be improved for future use. Since the major aim of this study was to test the validity and usability of this questionnaire, we provided a comments section at the end of the survey, where respondents were able to provide their feedback on this particular assessment tool. Following an analysis of these comments, we found that a few participants thought that the survey was excessively youth-focused. Given that the survey will be used primarily for assessment in educational contexts, and was thus designed with this application in mind, and since the average age of the respondents in this study was 33.7 years, this is a very valid comment, which points to the need to develop distinct versions of this assessment tool, depending on the characteristics of the target population. An improved version of this questionnaire should also attempt to condense the length of the survey in order to reduce the dropout rate. The present survey contained 80 questions and took about 20 minutes to complete; while this time commitment is still much more manageable than in the case of qualitative assessments (which generally take much longer), it should be shortened for future use. We will need to review the questions measuring simulation and collective intelligence – the two NMLs that did not emerge in the factor analysis – in order to make sure that they are properly evaluated in this assessment tool.

Implications for Future Research

Considering the inherent shortcomings of using quantitative methods to measure subjective skills and competencies, this study invites important questions about the applicability of quantitative methodologies in skills testing. Future research in the area of measurement and evaluation should explore the need to triangulate such quantitative measures with qualitative evaluations,

in order to achieve a fuller and more precise assessment of media literacy. For instance, a survey such as this one can be combined with practical workshops, where participants are able to actually demonstrate the skills that they report having. There is also a need to better understand the relationship between baseline and endline evaluations. Especially in the case of program evaluations, it is crucial to determine whether surveys such as this one can be used for both baseline and endline assessments, and specifically, what particular changes need to be made in order to best underscore the differences in media literacy levels between these two points of evaluation.

A consequential direction for future research in this field concerns the relationship between specific digital platforms and new media literacies. Some of the comments we received in the feedback section of the survey confirm this need for further clarification. "Your test assumes that particular media makes you more media literate", said one user, while another commented that "you're assuming that not engaging in certain media activities is due to lack of literacy rather than a personal choice. Maybe it just doesn't interest me or it runs counter to some other value or interest I might have." These are extremely valuable and warranted critiques, given that our conceptual framework of the NMLs considers these platforms as central to one's media literacy skills in today's digital environment, and thus assumes a strong connection between engagement with these tools and media literacy levels.

Finally, future work in the field of media literacy assessment should attempt to tackle the issues of standardization and scalability. Can a survey such as this one be used universally, with different populations and in different types of program evaluations? While a national (or perhaps even international) standard of media literacy evaluation would certainly be useful and instrumental in educational endeavors, our experience with this study indicates that an over-standardization of such assessment tools can lead to a decrease in the validity of the findings. Particularly, age and cultural background emerge as two critical factors in the tailoring of such surveys to best assess particular populations. We therefore hope that our study has helped to underscore the importance of achieving a proper balance between universal applicability and personal relevance. While further research is certainly needed regarding the feasibility of quantitative methods of assessment in the field of media literacy, we believe our study is a valuable starting point in this direction, and a much-needed inquiry into the challenges facing media literacy assessments in both national and international contexts.

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APPENDIX A: The NML Questionnaire

Part 1: Demographic Information

Sex: M/F

Age:

Education: Some high school/ Completed high school/ Some college/ Completed college/ Masters Degree/ PhD/ Other higher education degree

Income: Less than 10,000/ 10,000-20,000/ 20,000-30,000/ 30,000-40,000/ 40,000-50,000/ 50,000-60,000/ 60,000-70,000/ 70,000-80,000/ 80,000 or more

Ethnicity: White/ Hispanic/ African-American/ Asian/ Native American/ Pacific Islander/ Other

Primary language spoken at home: English/ Spanish/ Korean/ Chinese/ Russian/ Other (specify)

Part 2: Digital Participation

Do you have a computer at home? Y/N

Do you have Internet at home? Y/N

How many hours a week do you generally spend:

- a. On the Internet:
  - i. for school or work
  - ii. in your free time
- b. Watching TV (not on your computer)
- c. Reading books, magazines or print newspapers
- d. Playing games (online, on your cell phone, on PlayStation, Wii, Xbox etc.)

On average, how many hours a week do you spend on…

- a. Facebook
- b. Twitter
- c. YouTube
- d. MySpace/Bebo/Friendster/other social networking sites
- e. Online groups (Yahoo Groups, Google Groups, other online communities)
- f. Message Boards
- g. Games (online, on your cell phone, on PlayStation, Wii, Xbox, etc):
  - a. By myself
  - b. With other players
- h. Blogging (Blogspot, Wordpress, Blogger, etc.)
- i. Podcasting
- j. Other online activities (specify)

How often do you create projects that use video, audio, music, photographs, etc. outside of school or work, in your free time?

- a. Often
- b. Sometimes
- c. Rarely
- d. Never

Are you familiar with the concept of "media literacy"?

- a. no
- b. yes

If so, in your own words, how would you define "media literacy"?

Part 3: Assessing the 12 NML skills

NOTE: For all the questions below, the possible answers were: Strongly Disagree, Disagree, Neither Agree or Disagree, Agree, Strongly Agree.

The order of all questions in this section was randomized.

PLAY:

I have taught myself something new on a computer by seeing what happens when I play around with it.

When I have a new cell phone or electronic device, I like to try out all the buttons to see what they do.

I enjoy taking things apart and then putting them back together to find out how they work.
When I am faced with a problem, I usually try out a few different ways of solving it before I give up.
When I get stuck trying to solve a problem, I see it as a learning opportunity rather than a personal failure.

SIMULATION:
I try to put myself in other people's shoes to understand their problems or situations.
It is important to have simulations of dangerous events like earthquakes or safety evacuations, so that people know what to do in a crisis.
I appreciate simulation games and activities like Second Life, SimCity, The Sims, FIFA, Tiger Woods PGA Tour, etc.
I think about the way in which reality is represented in movies with computer-generated simulation, like Avatar, Inception, 300, Sin City, Iron Man, X-Men, etc.
I would like to participate in a simulation of something I cannot experience in real life, like flying a space shuttle to the moon, or piloting a fighter jet.

PERFORMANCE:
I have often taken on a different identity in order to experience something new or to solve a problem (online games, role-playing, theatre exercises).
I know what an avatar is.
I feel I am a different person online than how I act in person.
In certain situations, it is necessary to not be yourself.
Actors learn a lot about life from the roles they play in films and on stage.

APPROPRIATION:
I have incorporated other people's public work to create my own piece of art, like mixing music tracks, making an art collage, or stringing together video clips.
I have created something new that incorporates stuff from popular culture, like writing a short story based on a character in my favorite book, making a fan video, or a music remix.
When doing a creative multimedia project, I don't think it is wrong to take samples from my favorite artists' songs or videos.
If I would make a fan video about my favorite celebrity or artist or band, they'd probably be happy if they found out about it.
It is important for young people to learn how to use stuff from popular culture in their own creative ways.

DISTRIBUTED COGNITION
I don't agree that smart people are born smart.
My environment plays a big part in how smart I am.
I have to keep learning from my surroundings in order to become smarter.
I'm usually pretty good at knowing what do to do or who to ask if I want to find out more about a specific topic.
I find it important to use tools like spell check, a calculator, encyclopedia, etc to help me in my learning or work.

MULTITASKING
I manage to do my work successfully while doing other things like listening to music or texting.
I can usually prevent getting distracted and focus on
tasks well when other things are happening around me, like people talking, TV, music, internet, etc.
When I work on my computer, I like to have different applications open in the same time.
My generation is good at multitasking, i.e. doing several things at once.
I don't think anybody should give me a hard time if I feel I can work on several things at once.

COLLECTIVE INTELLIGENCE
I enjoy working with others on projects or assignments.
When I can't solve a problem or find a piece of information by myself, I use the internet or social media to connect with others and find what I am looking for.
I enjoy the collaborative aspect of things like Wikipedia, team games, online fan communities, community message boards, etc.
I think I can learn a lot from my friends.

I don't think it's a sign of weakness or stupidity to ask a friend or a colleague for help on work assignments or other problems.

JUDGMENT
I can effectively determine whether or not the information I find online is correct and reliable.
When I'm interested in a topic, I gather information from a bunch of different sources (like TV, radio, the internet, etc) to try to get the full picture.
When I search for something online and I get thousands of results, I can effectively decide which ones will be the most useful for me.
I am able to enter the right words in a search engine to find what I am looking for.
I can identify prejudice or bias in media (e.g. racism on certain websites, prejudice against women in song lyrics, etc).

TRANSMEDIA NAVIGATION
I follow my favorite shows, actors, musicians etc across different platforms and media (TV, magazines, internet, Facebook, Twitter, etc).
I can imagine the same story being told in different ways, such as through music, acting, writing, drawing, etc.
I often visit the websites (either official or fan-created) of my favorite TV shows, bands, etc.
If I am curious about something I saw on TV, I will check it out online later.
I'm happy that I can learn about my favorite things in different ways (on TV, on the internet, on Facebook, etc)

NETWORKING
I think that reading other people's recommendations on sites like Amazon or Yelp is useful in helping me make decisions.
I like to share my favorite links or creative work on social media sites like Facebook or YouTube or Twitter.
I often share links on Facebook, Twitter, my blog, etc.
When I go online, I like to feel like I am part of a community.
It is important for me to be able stay in touch with my friends online too, and not only in real life.

NEGOTIATION
My experience on the internet and/or in videogames has made me more understanding of those different from myself.
I think the internet offers a very important opportunity to get to know people from different backgrounds and different places.
I am happy that I can interact online or on Facebook with people from all over the world.
I have learned something new about another culture from surfing the internet, playing online games, participating in online communities or forums, etc.
I think that using the internet and/or playing videogames makes people more open to other cultures.

VISUALIZATION
I feel I understand things better when I can think of them visually.
When I prepare a project for work or school, I like to use as many images, graphs and diagrams as possible.
I think I am pretty good at understanding information from images, graphs, diagrams and other visual tools.
I like the fact that I can see all my friends on my Facebook profile.
I find Google Maps and/or Google Earth to be extremely useful tools.

Part 4: Civic Engagement
NOTE: For all the questions below, the possible answers were: Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree.

I believe I can make a difference in my community.
Being actively involved in national, state and local issues is my responsibility.
I have volunteered in my community.
I have done something to help raise money for a charitable cause.
I stay informed on current events and politics.