

How Does Digital Literacy Mediate Informal Learning on YouTube?

Cate Burlington

Memorial University of Newfoundland

Author Note

Correspondence should be addressed to: Cate Burlington, P.O. Box 3613, Amherst, MA  
01004 USA. Contact: [cate.burlington@gmail.com](mailto:cate.burlington@gmail.com)

### Abstract

Despite the enormous proliferation of instructional and educational videos available via the internet video repository YouTube, relatively little is known about how learners are using this resource for informal learning. This analysis examines the available research on how digital literacy skills allow learners to find and use the information they need on YouTube. There are five competencies of digital literacy that are pertinent to YouTube informal learning: searching, navigation, evaluation, knowledge assembly, and participation. Evidence from educational literature, as well as a number of other disciplines, is brought to bear on the question of how these competencies mediate informal learning on YouTube. The analysis finds that, although some YouTube features encourage and facilitate digital literacy skills, there is strong evidence that effective evaluation is not happening. The other four competencies show, at best, mixed evidence that they are contributing to informal learning effectively. Taken as a whole, the research indicates that informal learning in this medium is being hindered by the inadequacy of learners' digital literacy. The analysis ends with a recommendation for the enhancement of digital literacy education to help learners overcome these obstacles and use the instructional material on YouTube effectively.

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### How Does Digital Literacy Mediate Informal Learning on YouTube?

Informal learning is a life-long, ubiquitous process that's a vital part of how children and adults interact with the world. Whereas formal learning occurs in academic institutions, informal learning is undertaken by learners without a curriculum or teacher, drawing from sources present in everyday life (Livingstone, 1999; Merriam & Caffarella, 1999). The internet in general has been a tremendous resource for informal learning, as professionals and amateurs alike have been putting instructional materials online for over two decades, with early internet theorists noting that “the Net's growing universality will create priceless resources for learning” (Gilster, 1997, p. 2). In the past ten years, online video has exploded in popularity, becoming a valuable source of instructional materials. At least fifty percent of U.S. adults reported watching an educational online video in a 2013 survey, and that number has been steadily rising each year (Purcell, 2013).

YouTube is by far the most popular online video sharing site, and is home to millions of instructional and educational videos (Lee & Lehto, 2013). These videos cover every subject imaginable from academic, to professional, to interpersonal, to domestic, and more. A user can watch a video teaching how to clear a printer jam (Lee & Lehto, 2013), then go directly to a tutorial on cooking techniques (Li, Hong, Zheng, Yan, & Chua, 2010). Collectively, these videos serve as a vast audiovisual library for informal learning of all kinds. When people turn to YouTube as a source of instruction, they are taking part in a learning medium that is unmoderated, participatory, and self-directed (Burgess & Green, 2013; Tan, 2013). It is mediated only by the learner's own ability to gauge the accuracy and validity of the information they receive—that is, their digital literacy (Tan, 2013).

Digital literacy is the set of skills by which users find, extract, and utilize information

from the overwhelming abundance of sources that characterizes the internet today (Bawden, 2008; Gilster, 1997). In the absence of the traditional guideposts present in older forms of media, digital literacy is a vital form of self-guidance (Eshet-Alkalai, 2004). These skills are particularly necessary for those pursuing informal learning, because learners in the absence of instructors and curricula must make judgements about content for themselves, and their decisions will influence their learning outcomes (Meyers, Erickson, & Small, 2013).

Educators need to understand this phenomenon for several reasons. First, because informal learning can be an important complement to formal learning (Tan, 2013). Second, because educators are increasingly using internet resources, including YouTube, in their courses (Hew & Cheung, 2013), and they will need to appreciate the function of digital literacy with respect to these resources in order to use them effectively. And lastly because, according to groups such as the Partnership for 21<sup>st</sup> Century Skills (2015), building digital literacy is one of the most important functions of future-oriented education, which necessitates understanding how these literacy skills function in the everyday lives of learners.

The purpose of this analysis is to discover what the current research can tell us about the effect that digital literacy has on informal YouTube learning, and the ways in which it is succeeding or failing at helping learners navigate this resource. The research question driving this analysis is: how does digital literacy mediate informal learning on YouTube? In order to guide and refine the research, the following sub-questions break down what this means: Do learners have the digital literacy skills to use YouTube wisely? Do the features of YouTube help or hinder the use of these skills?

The remainder of this analysis will examine these questions. The first section will define

informal learning and the second will examine its parameters on YouTube. The following section will define digital literacy and examine which of its components are relevant in this context. The main body of the paper will lay out the evidence for how the following competencies of digital literacy function in informal YouTube learning: searching, navigation, evaluation, knowledge assembly, and participation. Finally, the conclusion will weigh the evidence in order to answer the research questions posed here and end with a recommendation for educators.

### **What is Informal Learning and Why Does it Matter?**

Only a small fraction of what people learn in the course of their lives is learned in a classroom. Learning is a life-long process that takes place every day in our workplaces and home lives, in school and in play, when we are undertaking a new endeavor, facing a new challenge, or simply looking at something in a new way (Livingstone, 1999; Merriam & Caffarella, 1999). Experts have developed many useful distinctions for understanding different types of learning. Two of these distinctions are important in this context: formal vs. informal learning; and explicit vs. tacit learning.

*Formal learning* is the term for learning that takes place in educational institutions, guided by instructors, taking place according to a curriculum, and meeting certain standards set by the institution or some other body (Merriam & Caffarella, 1999). Throughout the history of educational research, this is the area where most scholars have focused their attention. However, in the 1970's, researchers began to study the self-guided learning projects of adults. Based on the ideas put forth by Knowles (1970) that adults, long after they have finished their school years, frequently take part in self-directed learning, researchers began to examine learning beyond the school setting. Various terms self-guided learning, self-planned learning, lifelong learning,

and adult learning, these endeavors were studied by Tough (1971) and other researchers, who found that they constitute an important part of the learning puzzle. A picture began to emerge that individuals take part *informal learning* activities throughout their lives, often attaching great importance to these projects and devoting huge amounts of time and effort to them (Merriam & Caffarella, 1999). Livingstone (1999), put forth the following definition:

Informal learning is any activity involving the pursuit of understanding, knowledge or skill which occurs outside the curricula of educational institutions, or the courses or workshops offered by educational or social agencies. The basic terms of informal learning (e.g., objectives, content, means and processes of acquisition, duration, evaluation of outcomes, applications) are determined by the individuals and groups that choose to engage in it. (p. 4)

One of the key words in this definition is 'pursuit', which leads to the second important distinction needed here. Learning that is actively pursued and consciously acquired is referred to as *explicit* learning, whereas learning that takes place unconsciously, through everyday activities, is *tacit* learning (Eraut, 2000). Tacit learning can take place through observations of the world around us, through socialization, and through participation in events in our culture (Eraut, 2000). Although this is a significant form of informal learning, as tacit learning is the force that shapes individuals into capable participants in their culture, it is extremely difficult to measure or study (Livingstone, 1999). Given the difficulties of attempting to understand and gather data on tacit learning activities, only explicit informal learning will be considered in this analysis.

There are many reasons why informal learning is vitally important and worthy of study. Livingstone (1999), who conducted extensive quantitative research into informal learning practices in Canada, found that 95% of adults conduct some kind of deliberate informal learning that they consider significant, and that they reported spending an average of fifteen hours per week engaged in these activities. According to Livingstone, this is significantly greater than the

time and effort adults spend on formal learning. Informal learning can be motivated by the need to acquire job skills, or by the desire of personal enrichment, but it can also occur in response to a major life event such as marriage, illness, or becoming a parent (Merriam & Caffarella, 1999). Informal learning is a personally significant, extremely common, and highly important part of an individual's life.

### **What Does Informal Learning on YouTube Look Like?**

YouTube, founded in 2005, is the most popular video sharing website in the world; the videos available for instantaneous viewing on the site number in the billions (Lee & Lehto, 2013). In 2010, data scientists proclaimed that “[every] day, over a billion video plays are done across millions of videos by millions of users, and every minute, users upload more than 24 hours of video to YouTube” (Davidson et al., 2010, p. 293). YouTube is the Internet's go-to video repository, and in many ways, a cultural institution in and of itself (Burgess & Green, 2013). Instructional and educational videos are one piece of this ever-growing video library, covering a huge variety of topics. Studies have examined the use of YouTube in learning areas as diverse as laptop computer repair and printer troubleshooting (Lee & Lehto, 2013, p. 193) to cardiopulmonary resuscitation (Murugiah, Vallakati, Rajput, Sood, & Challa, 2011; Yaylaci et al., 2014), cooking techniques (Li et al., 2010), pregnancy safety information (Hansen et al., 2016), and banjo playing (Waldron, 2012).

It is impossible to say how many of the site's billions of videos are instructional in nature, given that there is no formal classification scheme on YouTube that would provide this information to researchers. However, survey data can provide useful guidance in examining the scope of the phenomenon of informal learning through internet video. A 2013 survey of U.S.

internet users found that 78% reported watching videos on the internet, and 50% reported watching an educational video online (Purcell, 2013). These viewers are not perfectly representative of the population, however. Survey data indicates that there are some differences according to age, socioeconomic status, and educational level. The same U.S. survey found that “rates of online video watching are highest among those under age 50, as well as those with higher educational attainment and household incomes” (Purcell, 2013, p.5). Level of formal education is a significant factor. Studies in both the U.S. and Canada indicate that those who have higher educational attainment levels are more likely to engage in informal learning in any medium (Busteed & Stutzman, 2015; Livingstone, 1999). For the purposes of this analysis, most of the data examined originates in the Western, English-speaking world. Questions of global differences in informal learning, digital literacy, and online video viewership are highly interesting and important ones, but they are outside the scope of this particular analysis.

There are unique features of YouTube as a resource for informal learning. YouTube is an unvetted and almost entirely uncontrolled medium. Unlike instructional materials found in books or on broadcast media such as TV, there is very rarely an editorial process of any kind in place for YouTube videos and uploading is unmoderated (Burgess & Green, 2013). These unique features can mean greater freedom of both topic and expression, but also that the quality of information can be highly uneven, as will be examined below. Additionally, the barriers to access on YouTube are extremely low, in both creating and viewing content. Although many YouTube videos may use more advanced equipment, an individual only needs a relatively recent cell phone in order to create and upload a YouTube video, or watch one (Burgess & Green, 2013). This is the major reason for the incredible proliferation of videos—any individual who wants to

share something with the world can simply create and upload a video in the space of a few minutes and have it be instantly available to anyone in the world who has an internet connection. These factors, which lead to the unconstrained nature of YouTube as an information source, necessitate the use of digital literacy in navigating the vast library of informal learning resources it contains (Tan, 2013).

### **What is Digital Literacy?**

In the research literature of education and learning, literacy has come to take on a far broader and more multi-faceted set of meanings than its original denotation of ability to read and write. Media literacy, information literacy, financial literacy, and more have all been variously defined in recent years (Bawden, 2008; Eshet-Alkalai, 2004). The particularly influential term *digital literacy* was first brought forward in 1997 by Paul Gilster. Gilster, a futurist and technology evangelist, laid out the case for why the conception of literacy would have to change in order to suit the new skills required by the internet age. He explained that simple reading and writing would not be sufficient in order to find, evaluate, and use information in the digital realm (Gilster, 1997). What Gilster did not do was define digital literacy in terms of specific or concrete skills. Due to the ever-changing nature of the digital environment, and what he saw as the even greater uncertainty in its future, instead of giving a concrete definition of digital literacy skills, Gilster outlined a broad framework through which we should attempt to understand information gathering and processing in digital media. His work even avoids laying out this framework in any systematic way, leaving open-ended opportunities for others to interpret digital literacy in their own context.

A review of the concepts of digital literacy summarizes Gilster's view by saying there are

“four core competencies of digital literacy: Internet searching, hypertext navigation, knowledge assembly, and content evaluation” (Bawden, 2008, p. 20). Many models and frameworks of digital literacy have been put forth by various scholars and researchers in the years since, focusing on varying aspects of the concept (Bawden, 2008; Eshet-Alkalai, 2004). The competing definitions and their rapid-paced change have even lead some researchers to conclude that the concept of digital literacy is inherently 'squishy'—that is, ambiguous and ever-changing (Chase & Laufenberg, 2011). However, despite these many attempts to redefine and expand the scope of digital literacy, most of these proposed frameworks still contain core competences that align very closely with Gilster's original four (Bawden, 2008). For the purposes of examining how digital literacy interacts with informal learning on YouTube, this analysis will use these four competencies, with the addition of one other category: participation.

The participatory nature of the modern internet has evolved dramatically since the 1990's. The overall change from the early internet in which content was primarily distributed from a small number of sources into the modern internet of radical participation and collectivist knowledge building was so seismic that in 2005 it was famously termed 'web 2.0' (O'Reilly, 2005). In this environment of social media, wikis, blogging, and video sharing, many researchers have concluded that digital literacy is “about effectively participating in our new digital world” (Meyers et al., 2013, p. 357). Rather than simply being able to find and use the information they need, digitally literate individuals must be able to generate content, contribute their own knowledge and opinions, and take part in the global online community. Participation, broadly defined, is increasingly seen as a vital component of digital literacy; most modern digital literacy frameworks include it (Bawden, 2008; Meyers et al., 2013). Given that the topic of this analysis

focuses on YouTube, in which all content is user-generated, participation must necessarily be included in the evaluation of digital literacy.

Therefore, the five components of digital literacy that are examined below are the four categories outlined by Gilster (1997), with one addition: searching, navigation, evaluation, knowledge assembly, and participation.

### **Evidence on Five Competencies**

This main section will examine the current evidence on how digital literacy mediates informal learning on YouTube, through each of the five competencies mentioned above. Each of the competencies will be discussed in its own sub-section.

#### **Searching**

Obtaining useful knowledge from the internet cannot begin until the learner can find the information they are looking for. The ability to choose the correct search method, and knowing which search terms to use, is a core piece of digital literacy, as is a willingness to “doggedly” sift through results (Gilster, 1997, p 172). In the absence of good search skills, search engines will “make decisions for us,” that is, show us what others want us to see, instead of what we are actually looking for (Gilster, 1997, p. 169). YouTube is one of the most searched sites on the entire internet (Benevenuto, Rodrigues, Almeida, Almeida, & Gonçalves, 2009), however, outside researchers do not have access to their search data or metrics, which makes quantitative analysis difficult. Given this lack of access to YouTube's search data, this section will begin with the quantitative data relating to internet search skills in general, then discuss the qualitative data available about informal learners searching on YouTube.

There have been several large-scale studies attempting to measure internet users abilities

to search for information, which have yielded mixed results. One study of British teenagers' internet skills reported that many who search for information on the internet believe that the search results are ordered in terms of the trustworthiness of the source: “[o]ne in five 12-15s who use search engines say they do not know how results are ordered (18%), and one in three thinks that the most truthful are shown first (32%)” (Ofcom, 2009, p.2). The authors of the study present this as alarming. However, 51% of their sample responded that either the most relevant sites were listed first, or that sites could pay money to move up the listings. Considering this result includes users as young as age twelve, and still indicates that the majority of users have a good idea how internet searches work, these results suggest that a sizable portion of the population is fairly well-versed in internet search technology.

One study of adult U.S. internet users suggested that many are quite confident in their ability to use internet searches to find what they want:

Most search users say they are confident in their own search abilities, and find what they are looking for most of the time. More than half of search users (56%) say they are very confident in their search abilities, while only 6% say they are not too or not all confident. And the vast majority of search users report being able to find what they are looking for always (29%) or most of the time (62%). (Purcell, Brenner, & Rainie, 2012, p. 4)

Although this data is self-reported and not based on any formal standard for digital literacy, it tells us that generally, people believe themselves able to use internet search tools competently.

In the specific context of learners searching for instructional videos on YouTube, one qualitative study reported broadly similar themes—that many feel confident in their ability to find which videos they were looking for, but a sizable minority are much less confident (Tan, 2013). The author summarized the learners' attitudes by saying, “some students only viewed

[YouTube] videos when recommended by others,” and “[this] seemed to be based upon the lack of confidence in their own ability to find suitable content with some students stating that they ‘wouldn’t know how’ to do so” (Tan, 2013, p. 469). This lack of confidence reflects a gap in these learners' digital literacy when it comes to searching.

Despite the paucity of information available on YouTube's search function, searching in general as a digital literacy competency seems to be divided between a significant portion of the population who have some understanding of how internet searches work and are confident in their abilities to use it (although this does not necessarily reflect specific skills), and those who lack this confidence.

### **Navigation**

Navigation as a digital literacy was initially described by Gilster as “the journey through text...enriched with choices” (Gilster, 1997, p. 3). This description of navigation is now somewhat out of date, being nearly twenty years old. However, the core concept, that in order to find and use the information they need, a user has to be able to competently make branching choices between resources, continues to be valid (Eshet-Alkalai, 2004; Meyers et al., 2013). This is especially true for informal learners, who are effectively designing their own curriculum as they go by choosing from among the wealth of available sources (Livingstone, 1999). Although these navigational features have not been studied directly in relation to informal learning, they are highly pertinent to the informal learning experience, as they may be significantly helpful to learners.

In the context of YouTube, the navigational features of the site itself are, perhaps surprisingly, helpful in the exercise of this skill. These features have been integral to YouTube

from the beginning. In 2006, one of YouTube's founders described a navigational tool—video recommendations—as one of the key features that helped the site become popular (Burgess & Green, 2013). In the modern version of YouTube, there are multiple features that allow users to navigate to different videos they might want to see; this section will examine two of these features that have been studied, and from which the literature can give us good information: *video responses*, and *suggested videos*.

Video responses were a previously existing feature of YouTube. When a user uploaded a video, other users were able to create video responses and have the response video automatically appear in a listing underneath the original; however, this feature was removed in 2013 (Panzarino, 2013), and the reasons why are illuminating. YouTube explained that this change was due to a low utilization rate of this feature (“So long”, 2013). A 2009 study by Benevenuto et al. points to why this feature became useless for navigating the site: content pollution. Advertisers and spammers saw related video listings as an exploitable feature that they could use to lure users to click through to their videos instead of to videos that were actually relevant to them (Benevenuto et al., 2009). This rendered the feature useless for navigation, and thus people stopped using it, dropping it from their digital literacy repertoire.

In contrast to response videos, the suggested videos feature has been a significant navigational tool for years and shows no sign of going anywhere (“Changes”, 2012). Recommended videos are an important navigation tool on YouTube, as they “allow users facing a huge amount of information to navigate that information in an efficient and satisfying way” (Davidson et al., 2010, p. 293). A computer science analysis by Zhou, Khemmarat, & Gao (2010) concludes that recommended videos are a major source of traffic to videos, and also a tool to

help viewers discover videos that interest them. By analyzing the view count and viewer behavior related to the recommended video listings, the researchers were able to conclude that “YouTube recommendation helps viewers discover more videos of their interest rather than the popular videos only” (Zhou et al., 2010, p. 409). In contrast to video responses, recommended videos have been found to be a feature that aids in navigation by helping users find videos that are useful to them.

The literature studying these features has two implications for this analysis. First, that YouTube itself is willing and able to deactivate features that hinder users in navigating effectively. Secondly, that when learners are navigating YouTube they are able to tell which features are not useful for finding the information they want (video responses), and which are (recommended videos), and they ignore or utilize those features accordingly.

### **Evaluation**

Evaluating the information found online is perhaps the most essential competency of digital literacy, and particularly so for informal learning. Gilster (1997) said that it is vital to have “the ability to make informed judgements about what you find online” because the internet is “unfiltered by editors” (p. 2). For those engaged in informal learning, it is particularly important to be able to evaluate the validity of the information they are receiving, or else they may learn and internalize incorrect skills and knowledge (Meyers et al., 2013). This section will examine several large quantitative studies that have directly examined the prevalence of misinformation on YouTube and learners' ability to evaluate it.

Inaccurate information abounds on YouTube, including in educational and instructional videos. Due to the total lack of constraints on uploading YouTube videos, there is no system or

authority to evaluate the trustworthiness of the information contained therein (Burgess & Green, 2013). In this area, there is significant reason to believe that users' digital literacy is failing them when evaluating the content of these videos. One type of instructional video in which this has been studied particularly extensively, and which will serve as an illustrative example, is in the field of public health information.

Two recent studies of instructional YouTube videos on the topic of cardiopulmonary resuscitation (CPR) conducted by medical researchers found that the majority of videos contained significant errors and inaccuracies (Murugiah et al., 2011; Yaylaci et al., 2014). In each case, YouTube was systematically searched for videos on the topic, and a team of medical professionals evaluated the videos for accuracy according to public health standards. One of the studies found that only 11.5% of CPR instructional videos fully met the standards, with the remainder containing substantial errors or omissions (Yaylaci et al., 2014). In addition to the abundance of misinformation on this life-saving medical technique, the second major finding of both studies is that the more accurate videos were not more popular—they did not have higher views or higher user ratings than the inaccurate videos (Murugiah et al., 2011; Yaylaci et al., 2014).

Health-information related studies on YouTube videos with similar results across different areas can be found in abundance. A study of YouTube videos about anorexia found that those containing misinformation were much more highly viewed than those that gave accurate medical information about the illness (Syed-Abdul et al., 2013). A study of videos on medication use in pregnancy, although not evaluating the popularity of videos, found that 88% of evaluated videos gave inaccurate information about drug safety (Hansen et al., 2016). The clear pattern is

that when medical professionals evaluate instructional YouTube videos for accuracy, they find that there is a great deal of incorrect information being perpetuated with no sign that the misinformation is being perceived by viewers.

The prevalence of inaccurate information is only to be expected, given the nature of the platform. Ideally, more accurate videos would have higher ratings and higher views (as they are evaluated by users and shared accordingly) (Murugiah et al., 2011), and less accurate videos would be less shared, leading to fewer views and lower ratings. This would indicate that users are evaluating the accuracy of videos effectively and reacting appropriately, but this is not happening in these studies. The fact that inaccurate instructional videos are equally or more popular than accurate ones is deeply troubling. When users turn to YouTube for informal learning, there is all too much reason to believe they are not evaluating the information sufficiently. Their digital literacy skills are not up to the task.

### **Knowledge Assembly**

Gilster (1997) defined knowledge assembly as the ability to obtain and manage information through “customizable datafeeds” (p. 197), and mentioned that the ability to customize one's workspace or environment played a significant role in using the internet in a literate manner (p. 23). Bawden (2008) described knowledge assembly as the process of “building a 'reliable information hoard' from diverse sources” (p. 20). In the context of learning on YouTube, this can mean taking advantage of several different features of the site that allow the user to customize their experience, receive updates from their preferred sources, and assemble relevant videos into a useful 'hoard.' Unfortunately, this is an area where the YouTube features in question have not yet been studied for digital literacy and learning implications. It is

still worthwhile, however, to examine these features and how they might potentially serve this digital literacy competency for learners.

Three such features are: the customizability of the YouTube home page, the ability to subscribe to video channels, and the creation of playlists. When a user signs in to YouTube, they are taken to a homepage that contains content they have recently viewed, content they have subscribed to, and also videos recommended for them based on their interests (“Coming Soon”, 2013). Part of the content of this homepage is drawn from user subscriptions to YouTube channels, which allow users to receive notifications when the owners of those channels post new content (“New Channels”, 2011). Playlists are another potentially useful feature, as a playlist is simply an assemblage of videos that any user can create around a theme of their choosing, and which other users can view and make use of (“Cut to the chase”, 2012). A user’s knowledge assembly skill could, for example, allow someone who is learning about cooking to subscribe to cooking-related channels, create a homepage that will display new cooking videos whenever they visit the site, and make their own playlists of relevant videos.

One qualitative study of informal learning did touch on YouTube playlists, and found that they can serve as a useful aid for accessing knowledge assembled by others (Tan, 2013). Until more research is conducted in this area, it is impossible to draw any significant conclusions about the impact these features are having on knowledge assembly for informal learning. At the moment, it is worth noting only that the design of YouTube seems to encourage the exercise of this particular digital literacy competency, and that this may prove useful to informal learners.

### **Participation**

Despite its absence from the original definition, many modern educational theorists take

the view that participation is central to the competencies of digital literacy (Meyers et al., 2013). On the modern internet, participation can be viewed as the ability to create content effectively and participate in discourse around it (Knobel & Lankshear, 2008). Since all YouTube content is created by users, participation is an essential aspect of digital literacy for all those using the site, including informal learners.

There are three senses in which participation, as a part of digital literacy, relates to informal learning on YouTube. In the first sense, participation on YouTube means users uploading their own videos to the site. The central function and purpose of YouTube is that it is a user-generated archive of videos (Burgess & Green, 2013), and so the most obvious form of participation is contributing a video to this archive. The second sense is in commenting on videos. Commenting, as a form of feedback, interaction, learning, and community-building, has long been recognized as an essential part of the participatory web (Asselin, Dobson, Meyers, Teixeira, and Ham, 2011; Tan, 2013).

In these two senses of the term, it would appear that there is very little participation by informal learners—or anyone else. Only a small fraction of those who view YouTube videos will ever upload one. In effect, the use of YouTube “has been largely as consumer, simply watching the videos posted rather than contributing as a registered account holder” (Tan, 2013, p. 465). In fact, throughout the participatory web, it is generally estimated that at least 90% of users simply consume content without generating any (Selwyn, 2015). Similarly, a study by Asselin et al. (2011) of YouTube comments on instructional videos indicated that little meaningful participation was occurring there, with the researchers finding that comments on instructional videos were typically social in nature, for example, thanking the uploader or asking for help.

These comments were rarely evaluative and seldom participatory in the sense of adding to the topic under discussion.

In the senses of uploading content and commenting on videos, therefore, YouTube users are not participating very much. Learning done on YouTube would seem from this perspective to be a one-way street, hardly more interactive than informal learning in any traditional medium. However, there is a third sense in which participation in the context YouTube must be considered. YouTube has built-in social media features that allow a video to be shared on Twitter, Facebook, and a host of other platforms with a few clicks (“Share videos,” n.d.). These features allow a form of participation not visible on the YouTube site itself, but very much present and a part of the process—that of sharing, annotating, and discussing YouTube videos on other platforms (Burgess & Green, 2013; Tan, 2013).

Sharing useful resources in networks of people with similar interests is a major part of the process of informal learning on the internet (Jenkins, 2006; Tan, 2013). This sharing allows discussion, and is an essential form of participation. Rather than merely viewing the video and moving on, learners are participating by passing the video along to interested peers, in a way that allows them to add their own commentary and host discussions among interested parties (Tan, 2013). While some aspects of participation as a digital literacy are rare among informal learners, in at least this one way, participation is very much a part of the informal learning experience on YouTube.

### **Conclusion: a Fractured Landscape**

YouTube is a fertile medium whose potential for informal learning has only begun to be assessed. The purpose of this analysis is to interrogate how this potential is being influenced by

the digital literacy of its users. Based on the five areas of digital literacy evaluated, it is clear that there are some aspects of digital literacy that are much more present than others in this environment.

Searching, one of the foundational skills of digital literacy from the time it was first defined almost twenty years ago down to the present day, is difficult to evaluate in this context. It's clear that being able to find the learning resources one needs is an important part of being able to learn from YouTube, and that some learners feel they do not have the skills to search competently (Tan, 2013). Generalized data about internet search skills suggests that perhaps half the population of internet users has an adequate level of search skill to find what they need (Ofcom, 2009; Purcell, 2013). Overall, it can be concluded that for some of the population of learners, not being able to find what they need is a serious hinderance to their ability to learn from YouTube.

Navigation within the YouTube site is key to its users, and several features of the site are built to aid this skill. By comparing two video-suggestion features—video responses and suggested videos—it is evident that YouTube recognizes the importance of navigation to the user experience. Whereas video responses were subject to content pollution to the point of rendering them useless (Benevenuto et al., 2009) and were subsequently removed, suggested videos have been found to be a useful navigational aid within the site in helping users find the content they want (Zhou et al., 2010).

Evaluation of the content found on the internet is the keystone skill of digital literacy, and is particularly important for those undertaking informal learning, who have no external guidance. Unfortunately, it is not at all clear that learners are able to evaluate the accuracy or

trustworthiness of video content on YouTube, given that systematic reviews of the information contained in health-related instructional videos have found both high levels of misinformation and a lack of correlation between accuracy and popularity of videos (Murugiah et al., 2011; Syed-Abdul et al., 2013; Yaylaci et al., 2014).

Knowledge assembly—the ability to build a hoard of useful resources and to customize one's digital environment—is ambiguous in its utility for learners on YouTube. While certain features of YouTube such as subscriptions, playlists, and the customizable YouTube homepage (“Coming Soon”, 2013; “Cut to the chase”, 2012; “New Channels”, 2011), all seem to facilitate the use of this skill, these features are relatively new and have not been studied enough to provide any useful data. Until more evidence becomes available, it's difficult to conclude anything in this area.

Participation, the hallmark of web 2.0 communities, which is seen as an increasingly vital part of digital literacy, would seem to be fundamental to YouTube, given that all of its content is user-generated. However, the data shows that very few of the users who view a video ever upload one (Selwyn, 2015; Tan, 2013), and that comments on instructional videos are almost exclusively social rather than participatory in the learning process (Asselin et al., 2011). The only realm in which participation makes up a significant portion of informal learners' interaction with YouTube is in their sharing of videos on other platforms, and the discussions that take place there (Tan, 2013).

Based on this analysis, it is possible to answer the two sub-questions and the main research question posed at the beginning of this paper: *Do learners have the digital literacy skills to use YouTube wisely?* There is evidence that learners possess some of these skills, but not

others. Some users are able to search effectively, some are not. Some forms of participation are being embraced, while others are absent. There is evidence that learners are able to use navigation tools effectively, and the tools for knowledge assembly are at least promising. However, learners' ability to evaluate instructional information presented on YouTube is inadequate. *Do the features of YouTube help or hinder the use of these skills?* YouTube's features do seem helpful to learners. In at least one case, when a feature became a hinderance to users, it was removed. Promising new features, such as the customizable homepage as a potential tool for knowledge assembly, have been added in recent years.

*How does digital literacy mediate informal learning on YouTube?* Digital literacy has a haphazard, ambiguous effect on informal YouTube learning. At best, certain competencies of digital literacy can help learners, in a fractured way. Informal learning on YouTube has many pitfalls, and digital literacy skills could potentially overcome many of them, but at present they do not seem adequate among learners to do so.

There are enormous possibilities for future research to deepen and enhance the understanding of digital literacy and its impact on informal learning on YouTube. More data is needed on the current state of digital literacy in general. Although there are ample theoretical perspectives and frameworks of digital literacy, there is little quantitative data available to show to what degree these skills are actually possessed by internet users. In addition to this, there is a great need for more in-depth study on how the features of YouTube impact informal learners and their use of digital literacy skills. Particularly in the realm of tools for knowledge assembly, as mentioned above, there is an important need to understand how these tools are being used for learning, and what implications their use has.

Based on the currently available research evaluated in this analysis, educators should be aware of the needs of the students with regard to digital literacy and how it may be impacting their informal learning endeavors. One of the responsibilities of modern education systems is to foster information technology skills and digital literacy (Partnership for 21<sup>st</sup> Century Skills, 2015; Voogt, Erstad, Dede, & Mishra, 2013). Given the gaps in digital literacy made apparent in this analysis, more digital literacy education is needed in order to prepare learners for using informal learning resources on the internet. Informal learning will be a life-long endeavor, one on which people will spend far more time than they will on formal education in the long term (Livingstone, 1999), and therefore helping prepare students for this endeavor is a high priority. Bawden (2008) argues that formalizing digital literacy education undermines the value of allowing online communities to define their own standards of efficacy and proficiency. However, given that users are learning incorrect CPR technique from YouTube every day, teaching individuals how to evaluate these resources is of paramount importance.

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