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## **An investigation of teachers' perceptions and integration of Web 2.0 tools into literacy instruction**

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**Abstract:** Web 2.0 tools have made its successful foray into literacy instruction in the K-12 educational context. This study examined 124 preservice and in-service teachers' understanding of their current use of Web 2.0 tools and their perceptions of integrating these tools into literacy instruction. Participants were found to perceive Web 2.0 tools positively, predominantly agreeing with its benefits related to enhancing engagement, exploration, and interaction, as well supporting content areas such as vocabulary. Precise genres within Web 2.0 tools family were identified as the most valuable for literacy instructors. We also found that literacy instructors' age, perceived usefulness, perceived capability, and proficiency and comfort levels with Web 2.0 tools as well as perceived obstacles all predict their actual use of Web 2.0 tools in the classrooms. However, their frequent personal use of Web 2.0 tools did not necessarily translate to successful instructional use. Practical implications and future research recommendations were provided in this study.

**Keywords:** Web 2.0; literacy instruction; instructional technology; social media.

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Pauline Salim Muljana is a PhD student in Instructional Design and Technology (IDT) at the College of Education and Professional Studies, Old Dominion University. She focuses her research on investigating how learning analytics informs instructional design to foster learning behaviours and strategies associated with academic success. Before joining the IDT program, she held instructional design responsibilities for 12 years at the California State Polytechnic University, Pomona that included design and development of courses with various delivery modes and multimedia learning objects, as well as facilitation of faculty workshops on instructional strategies, course design and effective technology integration.

Smruti Shah is a recent graduate from the Old Dominion University who obtained her Doctoral in Instructional Design and Technology. Her current research interests include learning about multimedia instructions, human performance improvement, and use of gamification in instructions.

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## 1 Introduction

As social media tools have become an integral part of people’s everyday lives, they offer new ways in which instruction can be designed, delivered and evaluated (Greenhow et al., 2009). Throughout the K-12 and higher education systems, various forms of online learning through the use of Web 2.0 and social media tools have started to permeate both

formal and informal learning settings. Over the years, a plethora of social media technologies have been adopted in the classroom to facilitate literacy instruction, as they hold great potential to revitalise the classroom and engage the learners (Engstrom and Jewett, 2005; Java et al., 2007). Researchers consistently found that social media tools can help promote classroom conversations both in and outside of the classroom (Saini and Abraham, 2019), foster online learning communities among learners, and provide a ubiquitous venue where literacy can be continuously practiced anytime, anywhere (DeVoss et al., 2010).

Albeit such opportunities, authentic practices of integrating social media tools into the classroom have been limited (Kim and Jang, 2015). Research has revealed teachers' suspicion, resistance, and apprehension, and therefore low levels of acquisition and curriculum integration (Almekhlafi and Abulibdeh, 2018; Hao and Lee, 2017; Hutchison and Reinking, 2011; Mumtaz, 2009; Tondeur et al., 2012). The extent to which social media technologies are incorporated into literacy instruction has been limited. Little agreement was found concerning what factors may hinder the incorporation of social media tools into literacy instruction (Hutchison and Reinking, 2011). Therefore, this study purports to understand teachers' current state of their use of social media tools and their perceptions of integrating these tools into literacy instruction. This article begins with a literature review highlighting the relevant research conducted in this area addressing the intersection of social media tools and literacy instruction, followed by a method section elaborating the research design, procedures, survey instruments and data analysis techniques. The results and discussion sections provide detailed findings of the study and interpretations of those findings, as well as suggestions and recommendations to practitioners and future researchers.

## **2 Literature review**

### *2.1 Defining Web 2.0 tools*

Web 2.0 tools encompass a wide range of internet-based tools and applications that promote and facilitate user-generated content as well as online communication around the world (Butler, 2012; Sadaf et al., 2012b, 2016). One unique characteristic of Web 2.0 is that it encourages active participation, engagement and interaction (Baltaci-Goktalay and Ozdilek, 2010; Beach, 2012; García-Martín and García-Sánchez, 2013; Yusop and Basar, 2017) due to its dynamic, social and volatile nature (Brown, 2012). Users can engage and interact with one another by uploading and sharing content, while others may offer responses or comments through the application of Web 2.0 tools (Ottenbreit-Leftwich and Brush, 2018). The term, Web 2.0 tools, is often used interchangeably with other terms such as social media, social software and social web (Brown, 2012; Manca and Ranieri, 2016). Kaplan and Haenlein's (2010, p.216) defined social media as "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content." Web 2.0 tools are also synonymously used with a broader term, information and communication technologies (ICTs), which is identified as digital forms of communication (Hutchison and Reinking, 2011). Despite the nuances of these two terms, for simplicity purpose, we used Web 2.0 and social media synonymously in this paper.

Prior literature has classified Web 2.0 tools into the following overarching genres:

- a media sharing sites
- b social networking sites
- c blogging (Baltaci-Goktalay and Ozdilek, 2010; Ottenbreit-Leftwich and Brush, 2018).

Media sharing sites, such as Flickr, Instagram, Vimeo, and YouTube, allow users to upload photos, audio and videos, while other users can comment. Social networking sites, such as Facebook and LinkedIn, enable users to network with others and be part of a community sharing similar interests or activities. Blogging and microblogging sites, such as Tumblr, Twitter, and blogger, allow users to post entries chronologically but displayed in reverse. Others on the site can comment as well. A distinguishing aspect of microblogging sites, compared to other tools, is the limitation of certain character counts. Social bookmarking sites, such as Delicious, allow users to save and manage web page bookmarks as well as share those bookmarks and search for others' saved bookmarks. Collaborative knowledge development tools like wikis allow users to collaboratively write and edit web content in addition to link to other web content. Current literature also noted less common categories such as instant messaging (i.e., AIM and Line) that allows two or more users to exchange written communication synchronously. We utilised this classification of Web 2.0 tools in the current literature to design our survey instrument.

## 2.2 *Theoretical framework*

An individual's acceptance of any information technology stems from a wide array of factors documented in the existing theoretical literature. The technology acceptance model (TAM) was considered as the most commonly used and cited theoretical framework for the investigation of the adoption of emerging technology and it has well predicted technology adoption and use (Davis et al., 1989; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000). TAM has been embraced by researchers to explore educators' intention of using technology (Fathema et al., 2015; Li et al., 2016; Rucker and Downey, 2016; Teo and Milutinovic, 2015). It is also one of the most commonly used frameworks in analysing factors around technology acceptance and adoption, including acceptance and attitude toward Web 2.0 tools usage for instruction (Dizon and Thanyawatpokin, 2018; Tatli et al., 2019; Teo et al., 2019). The two key constructs in the TAM research are perceived usefulness and perceived ease of use, as first posited by Davis (1985). Theory of planned behaviour (TPB) explains the connection between human attitude and belief toward an intention that will consequently trigger a behaviour (Ajzen, 1991). TPB addresses attitude toward behaviour, subjective norm, and perceived behavioural control that altogether influence the technology adoption. Sadaf et al. (2012b) reflected on these factors from a Web 2.0 integration angle. Attitude toward behaviour, which establishes teachers' perception of whether a technological tool should be perceived positively or negatively, can be seen as a personal or internal variable. The subjective norms, which underlie teachers' reasoning shaped by others' perception of whether a particular technological tool should be employed, characterise the external variable. The third variable, perceived behavioural control, referring to teachers' perception of their own self-efficacy over the technology use, is also influenced by available resources, and comprises both internal and external aspects. Although a wide variety of additional constructs were tested under TAM and its derivatives such as

usefulness, ease of use, and compatibility, peer influence and superior's influence, self-efficacy and facilitating conditions, amongst others, (Ajzen, 1991; Sadaf et al., 2012a, 2012b; Taylor and Todd, 1995), in this study, we only used them as a general framework to rather than exhaustively operationalised or measured all the possible variables while examining their relationships. We designed survey items that represent factors from both internal aspects (i.e., perceived usefulness, self-efficacy, comfort level and proficiency) and external aspects (i.e., peer learning, institutional support and barriers, facilitating culture and conditions) that influence teachers' perception of Web 2.0 integration.

### *2.3 Prior research on teachers' Web 2.0 integration*

Previous studies have explored preservice and in-service teachers' beliefs and attitudes toward Web 2.0 integration. These beliefs and attitudes are more likely influenced by both benefits and challenges as perceived by these teachers (Czerkawski, 2016; Li et al., 2016; Manca and Ranieri, 2016; Sadaf et al., 2012b, 2016; Saini and Abraham, 2019; Wake and Whittingham, 2013). Teachers are found to be generally familiar with Web 2.0 tools as they are part of their daily life (Almekhlafi and Abulibdeh, 2018; Baltaci-Goktalay and Ozdilek, 2010; Wake and Whittingham, 2013). Facebook and Google apps are reported as the most commonly used (Czerkawski, 2016) – Google Docs is also frequently utilised for individual and self-directed writing instruction (Mannion et al., 2019). Preservice teachers are believed to have at least a moderate knowledge of Web 2.0 tools such as blogging, document sharing, maps, photo-sharing, social networking and wiki (Wake and Whittingham, 2013). Similarly, a good percentage of preservice teachers are found to be comfortable with social networking, instant messaging, and internet telephony (Baltaci-Goktalay and Ozdilek, 2010).

Overall, prior literature suggests that teachers' beliefs and attitudes toward the utilisation of Web 2.0 tools in the instructional setting are positive. In particular, literacy teachers acknowledge the usefulness of Web 2.0 tools to boost students' literacy skills necessitated to succeed in college and professional settings (Howell et al., 2016; Hutchison and Reinking, 2011; McClay and Peterson, 2013; Wake and Whittingham, 2013). These perceived benefits revolve around supporting students' active participation or interaction, collaboration, and content sharing (Brown, 2012; Hutchison and Reinking, 2011; Manca and Ranieri, 2016; Sadaf et al., 2012b, 2016; Zafarani and Maftoon, 2018). Some studies highlight the significance of promoting collaborative writing activities supported by digital technologies, such as weblogs (Zafarani and Maftoon, 2018), in which students can 'work together to plan, draft, revise, and edit their paper' since these activities are found to engender positive impact for scaffolding students' writing performance [Graham et al., (2012), p.890]. It was also reported that these Web 2.0 tools supported students' digital skills (Li et al., 2016; Sadaf et al., 2012b, 2016), motivation, and literacy development (Damavandi et al., 2018; Wake and Whittingham, 2013).

Teachers are aware of their own vital role in facilitating effective learning (Callaghan and Bower, 2012). Callaghan and Bower (2012) found that these tools can motivate and engage students as well as promote their higher-order thinking; however, the achievement of this goal also depends on how the teachers implement the tools strategically such as through the alignment of pedagogical goal and implementation of the tools (Mannion et al., 2019). Hence, the characteristics of literacy teachers, particularly on the use of

Web 2.0 for literacy instruction, cannot be overlooked. Howell et al. (2016) reveal that teachers have a commitment to integrate Web 2.0 tools into literacy instruction and they can even imagine the use of these tools. Similarly, McClay and Peterson (2013), additionally, verify that teachers in Canada perceive the value of bringing digital tools into a composition curriculum. However, the issues arise when this commitment is not put into action, most likely, due to some barriers.

### *2.3.1 Literacy instruction and Web 2.0 integration*

Web 2.0 technologies have become a popular and powerful tool in the classroom and engage students in learner-centred pedagogy, collaboration, and content knowledge sharing for a genuine audience (Parmaxi and Zaphiris, 2017). Literacy teachers, therefore, need to design their instruction cautiously as they implement Web 2.0 to promote reading and writing, which involve the complex cognitive process of constructing meaningful content from print. Effective literacy teachers who embrace the balanced literacy instruction that encompasses several components of literacy skills (Bingham and Hall-Kenyon, 2013), should consider whether Web 2.0 tools are beneficial and practical for all areas of literacy. They should decide whether Web 2.0 tools are well aligned with their objectives of the literacy instruction, which include phonemic awareness, phonics, spelling, basic sight words, grammar, vocabulary, fluency, comprehension and academic content knowledge.

Employing Web 2.0 tools is extremely useful in supporting a wide range of literacy competencies (DeVoss et al., 2010; Engstrom and Jewett, 2005; Godwin-Jones, 2013). Blogging, wikis, podcasts, and media sharing are useful, especially in supporting students' acquisition of content knowledge, word identification, and vocabulary (An and Williams, 2010; Sharma and Unger, 2016). Parmaxi and Zaphiris (2017) recapitulated Web 2.0 tools' support of critical skills necessary for students to function successfully in today's society: student writing, community participation, engagement, communication skills, and autonomous learning. It is also important that teachers consider the limitations of the Web 2.0 technologies and employ additional tools that are well aligned with achieving the instructional objective of specific literacy skills (Chwo, 2015; Wang and Vasquez, 2012) to assure that students achieve competency in all components of literacy.

## *2.4 Barriers to Web 2.0 integration*

The current literature demonstrates various barriers to Web 2.0 integration, including the selection of tool and instructional strategies (Manca and Ranieri, 2016), learning curve to advance the tool use, lack of support (Ertmer and Ottenbreit-Leftwich, 2010; Manca and Ranieri, 2016), time constraints (Hutchison and Reinking, 2011), lack of technology access at school (Howell et al., 2016; McClay and Peterson, 2013), students' lack of technology access (Sadaf et al., 2012b, 2016), and students' lack of technical skills (Kung, 2018).

Intrinsically, some teachers may not feel confident about whether they can employ appropriate strategies for implementing Web 2.0 tools to enhance literacy competency (Howell et al., 2016). Some may have concerns regarding privacy and ethics, and issues conflating with their own views on pedagogy. For example, teachers in general may be wary that the tools can cause a distraction to students rather than optimising learning (Manca and Ranieri, 2016) or may have a thought that the student information is 'out

there' in the cyber world. Further, teachers might encounter a dilemma when selecting an appropriate tool in alignment with the learning contexts and goals (Li et al., 2016; Sadaf et al., 2016). Some may not even see any potential in Web 2.0 academic integration (Brown, 2012). Studies also reported that when considering Web 2.0 tools into literacy instruction specifically, teachers demonstrated apprehension towards additional issues such as plagiarism and copyright (McClay and Peterson, 2013) and cyberbullying (Saini and Abraham, 2019). Their understanding of the tool integration may be perfunctory (Hutchison and Reinking, 2011). It explains why they use the technologies for the sake of 'just using it', instead of addressing specific learning goals [Hutchison and Reinking, (2011), p.331].

Externally, teachers are reported to have encountered various issues related to the lack of support at school, either from the administrators (Manca and Ranieri, 2016), technical personnel (Manca and Ranieri, 2016), and/or colleagues (Sadaf et al., 2016), the lack of access to technology or the internet (Howell et al., 2016; Hutchison and Reinking, 2011), and lack of resources (Howell et al., 2016; Sadaf et al., 2012b). Specifically, in a national survey study, addressing teachers' perceptions of technology integration into literacy instruction, Hutchison and Reinking (2011) further reveal that literacy teachers' access to the internet may be less compared to the access obtained by the teachers of other subject areas.

## *2.5 Purpose of study*

Studies specifically addressing teachers' perception and integration of Web 2.0 tools in literacy instruction has been minimal (Howell et al., 2016; Hutchison and Reinking, 2011; McClay and Peterson, 2013). Despite the plethora of research into teachers' beliefs associated with technology integration, this study narrows the scope of research to the particular practices of literacy instruction and limits the population to preservice and in-service literacy instructors. Through examining pertinent personal beliefs and contextual factors, this study attempts to contribute to the literature regarding factors related to literacy teachers' perceptions and practices of technology integration. The following five research questions guide this study:

- 1 What are K-12 literacy teachers' overall beliefs in using Web 2.0 tools?
- 2 What are K-12 literacy teachers' belief and use of individual types and genres of Web 2.0 tools?
- 3 What do K-12 literacy teachers perceive as the relevance and benefits of Web 2.0 tools in supporting literacy instruction?
- 4 What do K-12 literacy teachers perceive as the challenges of integrating Web 2.0 tools into literacy instruction?
- 5 What factors impact K-12 literacy teachers' reported integration of Web 2.0 tools into literacy instruction?



### 3 Method

#### 3.1 Participants

The sample for this study comprised 146 students who were taking graduate-level courses in a literacy instruction program at the time of data collection. The participants were selected through purposeful sampling as they were the primary source of literacy teachers and/or who aspired to be literacy teachers. The sample included both preservice and in-service teachers either:

- a who already possessed an undergraduate degree and were enrolled for the sole purpose of meeting state's teaching licensure standards
- b who already had licensure, but were pursuing a master's degree in education.

After removing missing data, the final data was comprised of 124 participants (males = 7 and females = 117).

Most of the participants identified themselves as White or European American ( $n = 93$ ), whereas others identified themselves as Black or African American ( $n = 23$ ), Hispanic or Latino ( $n = 5$ ), American Indian or Alaska Native ( $n = 2$ ), and Native Hawaiian or Pacific Islander ( $n = 1$ ). About 79% of the participants were from the age range of 18–35 years (see Table 1). The remainder of the participants aged from 36–55 years old. Most participants ( $n = 85$ ) reported that they had been a teacher for less than a year, whereas 13 participants reported teaching for 1–3 years, ten participants for 4–7 years, nine participants for 8–14 years, and seven participants for more than 15 years. Twenty-nine participants reported having a teaching license, 24 participants reported not having a teaching license, and 71 participants reported being in the process of attaining a teaching license.

**Table 1** Participants' age distribution

<i>Age range</i>	<i>Frequency</i>	<i>Percentage</i>
18–25 years	61	49.2
26–35 years	37	29.8
36–45 years	14	11.3
36–45 years	11	8.9
36–45 years	1	0.8
Total	124	100.0

#### 3.2 Procedures

A total of five course instructors from a public university located in the Southeastern USA were asked to disseminate an online survey to their students. At the beginning of each class, the researchers provided an in-class information session explaining the goals and objectives of the study. All students were asked to participate voluntarily in the survey that would take 10 to 15 minutes to complete. The guidelines and suggestions of participation were explicitly explained to avoid coercion or undue influence before the data collection. The researchers then sent a Qualtrics survey link to all the participating

course instructors, and they shared with the students. We collected 146 responses after receiving data from over three semesters.

**Table 2** Survey subsection, representative item and response format

<i>Survey subsections</i>	<i>Representative item</i>	<i>Response format</i>
Pre-perception of Web 2.0 use	When it comes to pre-perception of Web 2.0 use, I consider myself: a A proponent (I can see how technology can be used professionally or for educational purposes).	Ordinal scale
Capability in using of Web 2.0 tools	Rate your capability in using Web 2.0 in general for personal use: not at all, low, moderate, high rate your capability in using Web 2.0 in general for literacy instruction: Not at all, low, moderate, high.	Ordinal scale
Perceived usefulness of Web 2.0 tools	To what extent do you believe in the following statement: • Web 2.0 tools should not be used in literacy instruction.	Likert scale matrix
Individual genres of Web 2.0 tools in literacy instruction	To what extent do you use the following Web 2.0 tools in literacy instruction? (Blog, wiki, social networking, social bookmarks, etc.).	Likert scale matrix
Benefits of Web 2.0 use	To what extent do you agree that Web 2.0 tools can be used to support your literacy instruction in the following areas: • Engage students in exploring real-world issues and solving authentic problems. • Facilitate educational management of marks, attendance, calendar, or reminders.	Likert scale matrix
Challenges of Web 2.0 use	To what extent do you agree with the following statements regarding integrating Web 2.0 tools in your literacy instruction: • I do not know how to use Web 2.0 tools. • Lack of time to prepare for using Web 2.0 tools.	Likert scale matrix
Overall perceptions about Web 2.0 use	What concerns you most see when you use Web 2.0 integration in your teaching? What benefits you most see when you use Web 2.0 integration in your teaching?	Open-ended

### 3.3 Survey instrument

In addition to the demographic questions, the survey contains a total of 15 questions inquiring about participants' perceptions of their Web 2.0 integration. The survey consisted of ten Likert-scale items on participants' perception of Web 2.0 integration on varying dimensions and five open-ended questions that asked students to justify their ratings by providing additional comments. The survey development and validation process followed procedures and recommendations in Dillman (2007). The Likert-scale questions were primarily adapted from Hutchison and Reinking (2011) and Crompton et al. (2016). Cronbach's alpha in values in the adapted studies reportedly ranged from

.82 to .96. Specifically, we also computed Cronbach’s to validate internal consistency, resulting in values ranging from .82 to .98 for the various constructs in the present study. Table 2 shows all the constructs investigated in our study.

### 3.4 Data analysis

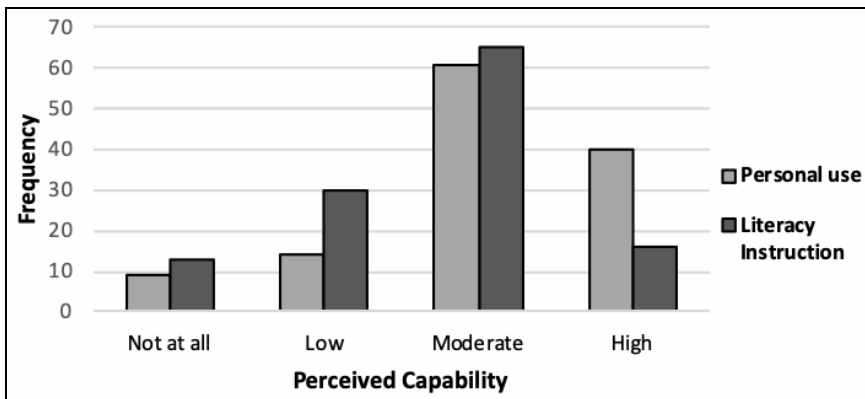
Data were analysed using descriptive and inferential statistical analysis in SPSS version 25. We used descriptive statistics to provide general trends amongst the participants. A series of stepwise linear regression was also performed to examine factors associated with perceived usefulness, intended use, and actual use of social media tools. Open-ended questions were analysed qualitatively using content analysis methods.

## 4 Results

### 4.1 RQ1: K-12 literacy teachers’ overall belief in using Web 2.0 tools

When it comes to the pre-perception of Web 2.0 use, 61.3% ( $n = 76$ ) of the participants rated themselves as a proponent. Only 3.2% ( $n = 4$ ) of the participants rated themselves as being a sceptic. About 26.6% ( $n = 33$ ) of the participants identified themselves as being neutral towards the use of Web 2.0 tools and 8.9% ( $n = 11$ ) had no opinion on this.

**Figure 1** Perceived capability to use Web 2.0 for personal use versus for literacy instruction



Participants were asked to rate their capability in using Web 2.0 tools in general for personal use and literacy instruction. For personal use, 49.2% ( $n = 61$ ) of the participants rated themselves having moderate capability, 32.3% ( $n = 40$ ) of the participants rated themselves having high capability, and 11.3% ( $n = 14$ ) of the participants rated themselves having low capabilities in using the Web 2.0 in general for personal use. Only 7.3% ( $n = 9$ ) of the participants identified themselves as having no capability at all to use Web 2.0 for personal use. When it comes to literacy instruction, it was found that 52.4% ( $n = 65$ ) of the participants had moderate capability, 12.9% ( $n = 16$ ) had high capability, 24.2% ( $n = 30$ ) had small capability and 10.5% ( $n = 13$ ) had no capability in using Web 2.0 for literacy instruction. The side-by-side paralleled histogram indicates that participants’ usage pattern between personal and professional use for literacy instruction

was consistent when the capability is low to moderate. However, this relationship flipped for the highly capable group. In other words, for those that were highly capable of using Web 2.0 personal use, they do not necessarily use it for literacy instruction (see Figure 1).

#### 4.2 RQ2: types of social media tools examined

Descriptive statistics were performed to assess the means of perceived usefulness of each Web 2.0 tool (see Table 3). The results indicate that video sharing tool ( $M = 3.43$ ,  $SD = .93$ ) was perceived as highly useful tool whereas, instant messaging ( $M = 2.66$ ,  $SD = 1.30$ ) was perceived as the least useful tool for literacy education. Descriptive statistics were also conducted to assess the means of actual usefulness of each type of Web 2.0 tools. The results indicate that video sharing tool ( $M = 3.03$ ,  $SD = 1.209$ ) was the highest used tool, whereas social bookmarks ( $M = 1.94$ ,  $SD = 1.03$ ) were the least used tool for literacy education.

**Table 3** Means and standard deviations of perceived and actual usage of Web 2.0 tools

Web 2.0 tools	Perceived usefulness		Actual usage	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Blog	3.13	1.14	2.14	1.05
Wiki	2.92	1.28	2.10	1.07
Social networking	2.76	1.17	2.32	1.27
Social bookmarks	3.17	1.48	1.94	1.03
Podcast	3.19	1.19	2.15	1.02
Instant messaging	2.66	1.3	2.04	1.17
Video sharing	3.43	.93	3.03	1.21

When asked to what extent teachers feel comfortable and are proficient using the following Web 2.0 tools for personal use, the results indicate that participants felt most comfortable with and were most proficient with social networking tool ( $M = 4.19$ ,  $SD = 1.21$ ) and were least comfortable with and least proficient with social bookmarks ( $M = 2.27$ ,  $SD = 1.43$ ) (see Table 4).

**Table 4** Frequency distribution of the perceived comfortableness and proficiency in using the Web 2.0 tools in general for personal use

Web 2.0 tools	Never use	Rarely use	Novice	Competent	Proficient
Blog	36	20	17	32	19
Wiki	39	23	19	32	11
Social networking	9	7	6	31	71
Social bookmarks	59	17	12	27	9
Podcast	44	22	17	26	15
Instant messaging	21	15	15	28	45
Video sharing	10	11	17	35	51

Note: Total number of participants = 124.

When asked to rate the usefulness of the following Web 2.0 tools for literacy instruction, it was found that 62.1% ( $n = 77$ ) of the participants rated blogs as useful to very useful. About 44.3% ( $n = 55$ ) of the participants rated wiki as useful to very useful for literacy education, while 54% ( $n = 67$ ) of the participant rated social networking tools as useful to very useful for literacy education. Approximately 33.9% ( $n = 42$ ) of the participants rated social bookmarks as useful to very useful for literacy education, 58.9% ( $n = 73$ ) of the participants rated podcast as useful to very useful for literacy education, 41.9% ( $n = 52$ ) of the participants rated instant messaging as useful to very useful for literacy education, and 80.7% ( $n = 100$ ) of the participants rated video sharing as useful to very useful for literacy instruction (see Table 5).

**Table 5** Frequency distribution of the perceived usefulness of Web 2.0 tools for literacy instruction

<i>Web 2.0 tools</i>	<i>Not at all</i>	<i>Moderately useful</i>	<i>Useful</i>	<i>Very useful</i>	<i>Do not know</i>
Blog	13	21	40	37	13
Wiki	19	31	34	21	19
Social networking	23	27	38	29	7
Social bookmarks	22	22	31	11	38
Podcast	13	20	39	34	18
Instant messaging	30	28	34	18	14
Video sharing	7	9	40	60	8

Note: Total number of participants = 124.

When it comes to the actual use of Web 2.0 tools in literacy instruction, the data indicates that 30.6% of the participants use blogs in literacy instruction. Identically, 30.6% of the participants use wiki in literacy instruction. About 42.8% of the participants use social networking tools in literacy instruction, but 22.6% of the participants use social bookmarks in literacy instruction. The percentage of participants who used podcast (30.7%) and instant messaging (29%) in literacy instruction was similar. The most widely used tools were video sharing tools as the survey reported that 63.7% of participants use them in literacy instruction (see Table 6).

**Table 6** Frequency distribution of the actual use of Web 2.0 tools in literacy instruction

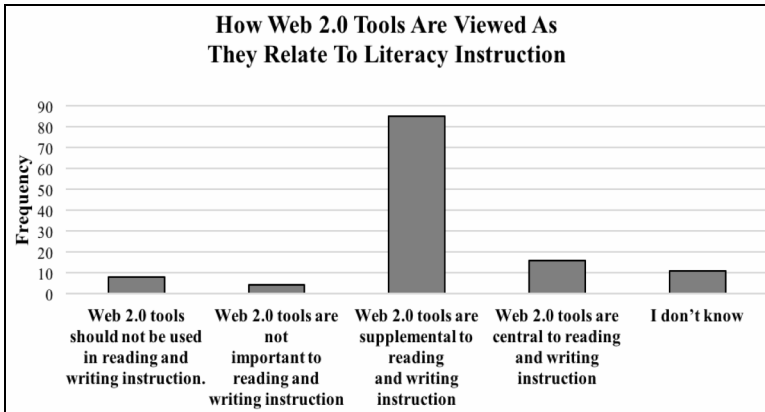
<i>Web 2.0 tools</i>	<i>Do not use, do no plan to use</i>	<i>Do not use but plan to use</i>	<i>Use occasionally</i>	<i>Frequently use</i>	<i>Always use</i>
Blog	39	47	23	12	3
Wiki	44	42	21	15	2
Social networking	45	26	30	14	9
Social bookmarks	51	45	14	12	2
Podcast	36	50	26	8	4
Instant messaging	53	35	21	8	7
Video sharing	13	32	34	28	17

Note: Total number of participants = 124.

4.3 RQ3: benefits and relevance of social media tools for literacy instruction

When asked “To what extent do you agree that Web 2.0 tools can be used to support your literacy instruction in the following areas”, 68.5% ( $n = 85$ ) of participants believed that Web 2.0 tools are supplemental to literacy instruction. Only 12.9% ( $n = 16$ ) of the participants believe that Web 2.0 tools are central to literacy instruction (see Figure 2).

Figure 2 Participants' belief about Web 2.0 tools as they relate to literacy instruction



Considering teachers' understanding of how Web 2.0 tools may support literacy instruction, we examined 11 sub-domains under the overall umbrella term of literacy instruction. We found that overall participants were optimistic about the benefits of integrating Web 2.0 tools into all areas. Specifically, the most agreed-upon areas where more than 82% of the participants agree that it is useful to integrate Web 2.0 tools were basic sight words, vocabulary and academic content (see Table 7). The least agreed-upon areas were phonemic awareness, phonics and writing fluency.

Table 7 Frequency distribution of participants' ratings for the usefulness of Web 2.0 tools in the particular areas of literacy instruction

Areas of literacy instruction	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
1 Phonic awareness	3	1	28	56	36
2 Phonics	3	1	25	57	38
3 Oral language	3	2	22	54	43
4 Basic sight words	3	0	19	61	41
5 Spellings	4	4	19	56	41
6 Vocabulary	4	0	18	55	47
7 Grammar	4	3	23	56	38
8 Comprehension	4	1	20	57	42
9 Reading fluency	3	2	25	55	39
10 Writing fluency	3	3	31	51	36
11 Academic content	4	0	17	60	43

Note: Total number of participants = 124.

**Table 8** Frequency distribution of participants' ratings for the use of Web 2.0 tools to support literacy instruction in the particular areas

<i>Support for literacy instruction</i>	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neither agree or disagree</i>	<i>Agree</i>	<i>Strongly agree</i>
1 Engage students in exploring real-world issues and solving authentic problems	2	1	13	63	45
2 Personalise learning activities and differentiate your lessons to address students' diverse learning styles	2	0	15	56	51
3 Provide students with varied formative and summative assessments aligned with learning outcomes	2	0	22	52	48
4 Develop further interest in subject matter, make learning more enjoyable, meaningful and accessible	2	0	14	52	56
5 Provide a dynamic visualisation of concepts to better communicate ideas to students	2	0	16	54	52
6 Promote student reflection using collaborative tools to clarify students' conceptual understanding and thinking	2	0	20	60	42
7 Link the formal learning to the informal learning spaces through providing anywhere and anytime learning opportunities	2	1	19	58	44
8 Facilitate educational management of marks, attendance, calendar, or reminders	2	0	21	60	41
9 Enrich my teaching experience through social collaboration with other colleagues and professional associations	2	1	17	65	39
10 Keep up-to-date with the pedagogical innovation and new trends in the instructional strategies to meet the needs of 21st century learners	2	0	17	58	47
11 Increase frequency communication and interaction with parents and family members	2	1	17	57	47
12 Enhance family involvement in education and family literacy	2	3	16	59	44
13 Other	26	0	51	18	29

Note: Total number of participants = 124.

We also examined in what way Web 2.0 tools may help enhance literacy instruction. The majority of the participants agree that Web 2.0 tools can be used to support literacy instruction (see Table 8). Based on the participants' open-ended responses, it was found that student engagement and differentiated instructions were the two most common benefits identified by the teachers and educators when using or planning to use Web 2.0 integration in teaching.

*4.4 RQ4: challenges of integrating social media tools into literacy instruction*

We specifically inquired about participants' challenges of integrating social media tools into literacy instruction (see Table 9). Amongst all the large obstacles, 41.1% ( $n = 51$ ) of the participants believed that the lack of access to Web 2.0 tools is the most significant obstacle to successful integration. The lack of time to integrate Web 2.0 tools because of the amount of time required to prepare students for high stakes testing was identified as another large obstacle. All other large obstacles included a lack of time during a class period, a lack of professional development on how to integrate Web 2.0 tools, as well as a lack of technical support. The most frequently mentioned small obstacles were: a lack of time during a class period, a lack of time to teach students the basic computer skills needed for more complex tasks, and a lack of model lesson plans integrating Web 2.0 tools.

**Table 9** Frequency distribution of participants' believed obstacles in integrating Web 2.0 into their literacy instruction

<i>Obstacles</i>	<i>Large obstacle</i>	<i>Small obstacle</i>	<i>No obstacle</i>
1 Lack of time during a class period	45	65	14
2 Lack of access to Web 2.0 tools	51	41	32
3 Lack of professional development on how to integrate Web 2.0 tools	45	60	19
4 Lack of technical support	48	53	23
5 Lack of time to prepare for using Web 2.0 tools	41	60	23
6 Lack of time to teach students the basic computer skills needed for more complex tasks	41	64	19
7 Lack of time to integrate Web 2.0 tools because of the amount of time required to prepare students for high stakes testing.	49	52	23
8 Lack of incentive to use Web 2.0 tools	22	54	48
9 Lack of privacy protection	30	56	38
10 Lack of model lesson plans integrating Web 2.0 tools	27	68	29

Note: Total number of participants = 124.

Based on the participants' open-ended responses, it was found that lack of access to the computer and Web 2.0 tools at the school and at home, lack of computer skills among students, time required to train students on how to use the Web 2.0 tools, technical difficulties and technology failures, finding the right material, change of resources, deceptive resources, Web 2.0 tools may be a distraction for students, and safety and privacy when using the Web 2.0 tools are some of the most common concerns of the



teachers and educators when using or planning on using the Web 2.0 integration in teaching.

#### 4.5 RQ5: factors impacting literacy teachers' Web 2.0 integration

When examining *perceived usefulness of Web 2.0 tools*, a stepwise linear regression analysis was conducted to assess which of the listed independent variables (i.e., participants' age, major, grade level they currently teach, and capacity to use Web 2.0 tools for literacy education) predict perceived usefulness of all the Web 2.0 tools. The results indicate that participants' age is the only significant predictor of the perceived usefulness of several tools, including blog  $F(1, 122) = 5.336, p = .023$ , wiki  $F(1, 122) = 11.683, p = .001$ , social networking tools  $F(1, 122) = 4.794, p = .030$ , social bookmarks  $F(1, 122) = 11.815, p = .001$ , podcast  $F(1, 122) = 11.269, p = .001$  and instant messaging  $F(1, 122) = 8.194, p = .005$ .

When considering the *actual use of Web 2.0 tools*, a stepwise linear regression was conducted to assess whether participants' *capability* to use Web 2.0, *perceived proficiency or comfort* with using the Web 2.0 tools, and *perceived obstacles* predict the actual use of Web 2.0 tools. The results indicate that all three abovementioned variables significantly influence and predict the actual usage of the Web 2.0 tools  $F(3, 120) = 40.105, p < .001$ .

When closely examining the obstacles, a stepwise linear regression analysis was conducted to assess which of the listed independent variables (i.e., participants' age, major, grade level they currently teach, and capacity to use Web 2.0 tools for literacy education) predict the different types of obstacles. The results indicate that participants' capability in using Web 2.0 tools is the only predictor for the following obstacles in using Web 2.0 tools: lack of incentive  $F(1, 122) = 8.961, p = .003$ , lack of privacy to use Web 2.0 tools  $F(1, 122) = 6.134, p = .015$ , and lack of model lesson plans  $F(1, 122) = 16.227, p < .001$ .

## 5 Discussion

This study aimed to analyse the current trends of preservice and in-service teachers' perceptions of integrating Web 2.0 technologies into literacy instruction. Overall, we found that participants perceived Web 2.0 tools positively, predominantly agreeing with its benefits related to supporting engagement, exploration, interaction, and making the learning experience personalised, fun, and enjoyable. Unique genres within Web 2.0 tools family were identified as the most valuable for literacy instructors. Content areas such as vocabulary and word identification were believed to be most adaptable to Web 2.0 integration. We also found that literacy instructors' age, perceived usefulness, perceived capability, proficiency and comfort levels with Web 2.0 tools, as well as perceived obstacles all predict their actual use of Web 2.0 tools in the classrooms.

Given similar findings from previous studies (Baltaci-Goktalay and Ozdilek, 2010; Wake and Whittingham, 2013) that many teachers are proponents of Web 2.0 for developing literacy skills, it was predicted that capability with and personal use of Web 2.0 would directly correlate to instructional use. However, in this study, those who rated themselves as highly capable in using Web 2.0 utilised it more for personal purposes and did not necessarily use it in the classroom. We speculate that those

participants who are heavy users of Web 2.0 personally may view it primarily as a tool for peer interaction and social engagement (Baltaci-Goktalay and Ozdilek, 2010; Beach, 2012; García-Martín and García-Sánchez, 2013; Ottenbreit-Leftwich and Brush, 2018), and thus not appropriate for academic activities. This finding agrees with Efe (2015) and Hew (2011), who found that although teachers and students use Web 2.0 technology frequently, they do not necessarily use it for educational purposes.

Our study further validated results from prior studies that age, perceived challenges, and comfort level with Web 2.0 tools are strong predictors of perceived usefulness and actual use of Web 2.0 tools (Beresford and Cobham, 2011; García-Martín and García-Sánchez, 2013; Moran et al., 2011). The younger the teachers are, the more likely that they perceived Web 2.0 tools in a positive light and use them in their literacy classroom. The higher level of comfort they perceived, the more likely they will incorporate Web 2.0 tools into their instruction. These findings indirectly validate Li et al.'s (2016) conclusion that perceived ease of use of technology was a significant predictor of technology adoption in the classroom. However, the results of this study were in congruence with Li et al.'s (2016) findings regarding perceived barriers of technology adoption being an insignificant predictor. The perceived obstacles in this study negatively influenced the actual usage of the Web 2.0 tools.

Our study further highlighted critical considerations with regard to using the various Web 2.0 technologies relevant to literacy instruction. We speculate that the participants tend to perceive video sharing, blogs, social networking, wiki, and podcasts, as highly useful, while instant messaging and social bookmarks were seen as least useful. This was perhaps due to their familiarity with such tools as they were adopted by their respective local educational systems where they either teach currently or will teach in the future. When participants believed video sharing to be the most useful tool, they actually used it most frequently for literacy instruction. By the same token, instant messaging and social bookmarks, which were judged less educational, were in fact used less. These findings are consistent with prior studies that emphasised teachers' actual integration of Web 2.0 tools for instruction were closely linked with their attitudes and beliefs concerning the usefulness of the tools for student learning (DeVoss et al., 2010; Engstrom and Jewett, 2005; Java et al., 2007) and their proficiency and familiarity with the available technologies (Ajjan and Hartshorne, 2008; Palaigeorgiou and Grammatikopoulou, 2016). In addition, this resonates with a prior study utilising TPB (an extension of TAM) as a framework that there is a connection between attitude toward behaviour and teachers' perception of whether a technological tool is perceived positively or negatively (Sadaf et al., 2012b). Essentially, the usefulness of the tools that the teachers perceive is a determinant of their intention to use the tools, in line with prior studies guided by TAM (Hismanoglu, 2012; Wong et al., 2012) and DTPB (Sadaf et al., 2016) that is deeply rooted in TAM.

This study adds to the existing literature by identifying the three components of literacy instruction most benefited as well as the three least benefited from incorporating Web 2.0 tools. Given the fact that media sharing, social networking sites, and blogging tools typically enable students to produce and exchange meaningful content information for a genuine audience (An and Williams, 2010), the participants believed that utilising such digital tools to engage students in a higher level of thinking would aid students the most in gaining three important components of literacy ability; content knowledge, word identification and vocabulary. The participants viewed Web 2.0 technologies as enabling

students to become creators of knowledge by offering them the opportunity to actively create comprehensible content. The components of literacy ability identified as benefiting the least from incorporating Web 2.0 tools are phonemic awareness, phonics and writing fluency. This finding reflects the teachers' belief that the nature of learning letter and sound knowledge is considered a constrained skill or 'closed' knowledge given the correct-or-incorrect nature of this knowledge (Pfost et al., 2014). Thus, teachers tend to use tablets and other digital applications designed to assist young children in acquiring letter-sound knowledge via teacher-led instruction (Nicholas et al., 2017).

Finally, our study highlighted critical considerations for utilising Web 2.0 technologies in literacy instruction. Like all instructional tools, Web 2.0 has benefits and obstacles. Similar to many researchers (Brown, 2012; Baltaci-Goktalay and Ozdilek, 2010; Beach, 2012; García-Martín and García-Sánchez, 2013; Ottenbreit-Leftwich and Brush, 2018; Shin and Seger, 2016) who believed that Web 2.0 tools encourage students to engage and interact with one another with respect to communicating and practicing literacy, the participants of this study recommended their use. Reasonably, they believed that Web 2.0 has been a driving factor in students' literacy practices and adopted it to facilitate literacy instruction through differentiated instruction and student engagement in exploring real-world issues and solving authentic problems.

As suggested by Li et al. (2016), teachers' perceived barriers to integrating social media tools into literacy instruction may not be strong enough to prevent them from potential integration of Web 2.0 technologies. Nonetheless, the lack of access to Web 2.0, limited time to integrate Web 2.0 tools, and limited technical support were still identified as major obstacles by the participants in this study, even though schools have the resources to provide the tools and internet access required.

### *5.1 Practical implications for literacy instruction*

Our findings overall suggest that literacy teachers' personal use of Web 2.0 tools does not naturally translate into their professional and classroom use of these tools in their teaching. Preservice teachers in our study have noted the usefulness of the Web 2.0 technologies for literacy instructions and their familiarity with the tools, but they utilised these tools more for personal use than professional use. Since familiarity and perceived usefulness is not a hindering factor, teacher education program may consider scaffolding preservice teachers' strategic use of the tools for literacy instruction and introducing them early in the program.

Teachers can be exposed to the tools through the coursework learning tasks and assignments, providing them with the learn-by-doing learning opportunities which can be further explored and experimented with when they are in service. For example, as part of a learning activity, preservice teachers can share a collection of resources usable for a class project through a platform like Twitter or Delicious (a social bookmarking site) and obtain feedback from classmates. To promote the comprehension of the weekly class readings, the preservice teachers can be assigned to collaboratively contribute to the summary and key takeaways in a Google Doc. They can also practice writing blogs instead of turning in traditional paper-based writing assignments. For in-service teachers, teachers can have students engage in a writer's workshop incorporating a blog, and encourage them to post their work, after which they will and receive feedback, both complimentary and critical, from their peers helpful for revision and editing. Students will benefit from engaging in rich literacy experiences, composing and publishing their

ideas on the internet via a classroom blogging activity. A teacher may have students use the know-want-learn (KWL) reading strategy in Edmodo, a secure social network tool that can increase active interactions among students in and out of the classroom. Students may begin by brainstorming with knowledge they already possess about a topic and participate in the community of learning while considering what they want to know, and finally writing about what they have learned. Listening to podcasts, such as podictionary is a useful way for students to engage in discussion and use Possible Sentences strategy to predict several sentences in context to build vocabulary knowledge.

Teachers in our study also reported a wide variety of challenges that they experienced with regards to Web 2.0 integration. Therefore, providing continuous support for teachers to pursue professional development should be highly considered by school administrators. One way is by promoting collaboration amongst teachers (McClay and Peterson, 2013). Such a collaboration would encourage teachers to interact with other like-minded colleagues in exploring new literacies practices by using the tools and in trying out innovative strategies. Together in this journey, teachers can learn and succeed together as well as support one another. It is also important to emphasise that the Web 2.0 tools, such as social networking tools, are beneficial for teachers to attain just-in-time professional development. As teachers already express their familiarity and frequent use of social networking tools, they can easily reach out to colleagues through Facebook and LinkedIn groups as well as Twitter whenever they need new ideas and strategies. This professional learning venue allows interaction beyond face-to-face contact with other teachers who are already utilising the technologies; educators have attested the benefits of this venue to their support professional growth in the realms of teaching and learning (Trust et al., 2017).

With a lack of access and time being one of the most concerning barriers according to our study, school administrators need to support their teachers who see the value of Web 2.0 for literacy instruction by ensuring easy access to various Web 2.0 tools and providing the necessary technical support for their successful usage in literacy instruction. To eliminate identified barriers such as limited time to integrate Web 2.0 and a lack of time to teach students basic computer skills needed for more complex tasks, teachers should consider incorporating Web 2.0 in literacy instruction in a holistic manner rather than teaching software programs as add-on tasks.

## *5.2 Limitations and directions for future research*

We recognised that this study was conducted using convenience sampling and self-reported data. This poses a threat to external validity as generalisability of the results may be compromised. As course instructors facilitated with data collection, responses may be biased in that participants may have responded to the survey out of social desirability which may not be truly reflective of their own views. The survey research design also leaves little room for teachers to reflect on and report in detail what made them believe the way they believe. Although Web 2.0 tools were considered critical by the participants, future research is necessary to investigate their actual implementation in literacy instruction. Future studies should include qualitative data in order to address why teachers' perception of themselves as highly capable with Web 2.0 for personal use does not necessarily result in greater usage of Web 2.0 technologies for educational means. Observations and comparisons of groups of teachers who teach at different grade levels

will also be useful in identifying how Web 2.0 is integrated into different components of literacy. Future studies would also benefit from a focus on strategies that teachers can apply to overcome barriers, both perceived and actual, to adopting Web 2.0 technologies for educational use.

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