

## **EXPLORING POSSIBILITIES AND CHALLENGES: LEVERAGING SOCIAL MEDIA AFFORDANCES FOR ENHANCING-STRUCTURED PROBLEM-SOLVING SKILLS**

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**Abstract:** Contemporary teaching and learning efforts prioritize the cultivation of problem-solving skills in learners, according to educators. However, engaging in problem-centered learning poses difficulties for learners, prompting educators to explore various methods of assisting learners in comprehending intricate material. Education professionals have easy access to social media programs, which in turn offer several possibilities for utilizing these platforms to enhance teaching and learning activities. Although social media platforms provide educators with exciting opportunities to assist learners in real-world problem-solving situations, they also present challenges. However, there is limited research on how these tools can specifically enhance the development of learners' problem-solving skills. The objective of this article is to determine the significant educational benefits of social media and examine how these benefits can potentially assist in solving complex problems. This paper presents novel strategies for promoting problem-centered learning through the utilization of social media, aimed at researchers and educators.

**Keywords** educational affordances · social media · problem solving

### **I. INTRODUCTION**

The potential of technology to enhance teaching and learning has long been debated as whether technologies fundamentally change teaching and learning processes (see Clark, 1983, 1994; Kozma, 1991, 1994). Arguably, technologies emerging and developing in the twenty-first century (e.g., social media) have evolved in profoundly different ways compared to previous technologies. Becker (2010) articulated the uniqueness of these evolutions: “the rate of change for newer, faster, and more ubiquitous ways to access communication technologies and the information now stored digitally continues to increase” (twenty-first century Clark section, para. 2). Simultaneously, the way individuals—especially youth—interact with technology as part of their daily routine has drastically changed (see Rideout et al.’s report from 2010).

Perhaps, social media represent one of the best examples of a technology that is “fundamentally different from, and more powerful than” previous technologies (Kaplan & Haenlein, 2010, p. 60). Social media applications offer individuals “new structures” to connect with people they “admire” or “find interesting” (Boyd, 2015, pp. 1–2). In short, “social media is a phenomenon” (Boyd, 2015, p. 1), and their emergence “enabled an evolutionary leap forward in the social component of web use” (Obar & Wildman, 2015, p. 745). While the specific properties of social media are not necessarily “new, their relation to one another because of networked publics creates new opportunities and challenges” (Boyd, 2014, p. 11). To strategically consider how contemporary technologies, like social media, are evolving and to determine value, many researchers have adopted an affordance-based approach—both in education (Jin, 2018; Xue & Churchill, 2019; Zawawi et al., 2017) and beyond (Chen et al., 2019; van Osch & Coursaris, 2017). By focusing on affordances (e.g., qualities emerging from user and tool interaction, Gaver, 1991), not only are researchers able to consider the collection of features of a given tool to distinguish it from other tools (Treem & Leonardi, 2013), but also, educators can be informed in their technology integration decisions. However, cognizant of Clark’s argument, technology advancement alone is not enough to generate educational transformation. Ideas of what comprises contemporary employability have also shifted (de Fruyt et al., 2015). That is, recently, individuals are increasingly expected to complete “non-routine and interactive tasks” versus “routine operations” in the workplace (Neubert et al., 2015, p. 238). While many skills are important for the twenty-first century workplace (e.g., creativity, collaboration, information literacy), problem solving is generally acknowledged “among the most meaningful and important kinds of learning and thinking” (Jonassen, 1997, p. 65). To prepare students for future professional ill-structured realities, educators have focused on facilitating “authentic and active” learning experiences (Tawfk et al., 2019).

Nevertheless, facilitating problem-solving skills is challenging, and during problem-centered learning experiences, the instructor bears much of the responsibility for guiding students to successful outcomes (tawfk et al., 2020). Likewise, students face challenges while participating in problem-centered learning experiences (koehler & ertmer, 2016). Some educators have explored the use of technology to support students' problem-solving skill development (koehler et al., 2017; goeze et al., 2014). Although affordances of emerging technologies, like social media, and the facilitation of problem-solving skills have been previously researched, limited efforts have considered the integration of these two areas to offer new insight into successfully facilitating problem-centered methodologies. Therefore, the purpose of this paper is to explore how the affordances of a readily available and used technology like social media can support the problem-solving process. We first synthesize literature related to problem solving and social media affordances. Then, we provide specific strategies for facilitating problem-solving skills supported by social media affordances. We offer specific considerations necessary for intentional social media use during problem-centered learning.

### **Problem solving**

Problem-solving skills are generally recognized as an important outcome of twenty-first century education (hesse et al., 2015; van merriënboer, 2013). Problems are defined as situations “in which you are trying to reach some goal, and must find a means for getting there” (chi & glaser, 1985, p. 229) and are categorized in different ways to underscore

Unique features (e.g., well-structured, ill-structured, story, design; chi & glaser, 1985; jonassen, 1997, 2011). The ability to solve ill-structured problems is considered an “essential competence” by contemporary standards (eichmann et al., 2019), and these problems have been conceptualized as having ill-defined parameters, inflexible constraints, and many possible solutions (jonassen, 1997). Although most educators agree the development of problem-solving skills is a worthwhile learning outcome, implementing methods promoting such skills can be challenging (ertmer & koehler, 2014; koehler et al., 2019; stepich et al., 2001). To conceptualize the problem-solving process and support the development of these skills, specific models have been proposed to describe the process used for solving ill-structured problems (see choi & lee, 2009; jonassen, 1997; svihla & reeve, 2016). These models focus on key processes and behaviors taking place while problem solving: understanding problem situations and contexts, considering stakeholder perspectives, generating possible solutions, using a rationale to support decisions, and implementing and evaluating selected solutions. Table 1 captures several conceptualizations of problem-solving processes. In these models, specific steps are articulated; however, while some phases must precede other phases for effective problem solving (e.g., problem representation before solution generation), problem-solving phases are generally considered iterative and non-sequential (kim & hannafin, 2011) and have traditionally been grouped into two primary categories by scholars: problem finding (e.g., developing a clear understanding of a problem) and generating solutions (e.g., creating solutions addressing defined problems) (chi & glaser, 1985; ertmer & stepich, 2005; eseryel et al., 2011; law et al., 2020). By synthesizing these models, problem finding comprises three primary actions: (a) articulating the problem space, constraints, and stakeholder roles; (b) considering diverse perspectives of stakeholders and their responsibilities; and (c) locating additional related information, resources, and tools that deepen understanding of the problem, context, and stakeholders. The generating solutions phase comprises (a) proposing potential solutions; (b) determining the value of a potential solution; (c) justifying, communicating, and presenting a specific solution; (d) implementing a selected solution; and (e) adapting a solution. Additionally, monitoring (e.g., reflecting on understanding to “develop arguments to support their mental model of the problem space,” jonassen, 1997, p. 82) is a phase crossing both problem finding and solution generation.

### **Learner roles and challenges while problem solving**

The problem-solving processes captured in the models cover what learners should be completing as they participate in problem-centered learning experiences. However, previous research suggests novices do not always achieve desired results, even in intentionally designed problem-centered learning (ertmer & koehler, 2015). For instance, novices commonly spend limited time understanding a problem, skipping to developing solutions (koehler et al., 2019; ng & tan, 2006; stepich & ertmer, 2009), list known facts without synthesizing the information into primary issues (ertmer & stepich, 2005; law et al., 2020), “take available information at face value” without considering underlying

principles (ertmer & stepich, 2005, p. 40), and fail to recognize relationships among issues (ertmer & stepich, 2005; law et al., 2020). Some of these challenges result from novices failing to see value in framing problems and their inexperience with this type of activity (law et al., 2020; svihla & reeve, 2016).

**Table 1** Ill-structured problem-solving models

Model	Steps
Jonassen (1997)	Articulate problem space and contextual constraints Identify and clarify alternative opinions, positions, and perspectives Generate possible problem solutions Assess the viability of alternative solutions by constructing arguments and articulating personal beliefs Monitor the problem space and solution options Implement and monitor the solution Adapt the solution
Ge & Land (2004)	Problem representation Generating or selecting solutions Making justifications Monitoring and evaluating
Choi and Lee (2009)	Understanding situations and contexts where multiple problems may exist Identifying problems by considering the multiple perspectives held by different stakeholders Generating possible solutions Choosing appropriate solutions with a rationale Implementing and evaluating the solutions
Kim and Hannafin (2011)	Identification Exploration Reconstruction Presentation communication Reflection negotiation
Svihla and Reeve (2016)	Problem framing Gather information Ideation Develop solutions Evaluation

When generating solutions, novices ignore given constraints (ertmer & koehler, 2014; ertmer & stepich, 2005), tend to solve problems in a single step (ng & tan, 2006), stick to solution strategies they are familiar with (law et al., 2020; ng & tan, 2006), address the problem space more deeply with support from an active facilitator (ertmer & koehler, 2015), fail to recognize relationships among solutions (ertmer & stepich, 2005), and offer rigid solutions (ertmer & stepich, 2005). Primary factors preventing effective problem solving include an individual's "domain knowledge" and previous experience as expert "problem solvers have better developed problem schemas, which can be employed more automatically" (jonassen, 2000, p. 69). When regulating problem solving, learners experience challenges while both problem finding (e.g., fail to consider relationships, "prior knowledge," and "emerging problem Representations," law et al., 2020, p. 326) and generating solutions (e.g., adopt a linear approach to selecting a solution, law et al., 2020). Finally, problem-centered learning is typically completed as a collaborative process, necessitating learners to develop skills in regulating the "collective activity" of the group (häkkinen et al., 2017). As a result, collaboration can be challenging for learners as they struggle with managing differing perspectives and articulating a reasonable argument (häkkinen et al., 2017; koehler et al., 2020).

### Facilitator role during problem-centered learning

Problem-centered methods (e.g., case-based learning, problem-based learning) can facilitate the development of problem-solving skills in learners (koehler et al., 2019; pease & kuhn, 2011; tawfk & jonassen, 2013). In problem-centered learning, students analyze complex problems found in professional settings to gain vicarious experience (stepich & ertmer, 2009). To create an effective problem-centered learning experience, a facilitator's ability to design, implement, and manage the learning experience (e.g., asking meaningful questions at the appropriate time) appears to be more influential than specific content expertise (ertmer & koehler, 2015; leary et al., 2013). Implementing problem-centered methods is challenging for instructors as the facilitation process is non-linear and requires facilitators to provide an appropriate amount of support to learners (ertmer & koehler, 2014). However, effective facilitation of problem-centered learning includes: planning, implementing, and evaluating (rico & ertmer, 2015). Facilitators must start with meaningful planning: selecting an appropriate problem or case on which to center the experience (rico & ertmer, 2015), mapping out the potential problem space (ertmer & koehler, 2014; hmelo-silver, 2013), crafting learning outcomes for

the experience (rico & ertmer, 2015), and developing learning activities that prompt careful consideration of the problem under investigation (e.g., discussions, role-playing; ertmer & koehler, 2015; rico & ertmer, 2015). Additionally, as a collaborative experience, facilitators must intentionally structure groups and scaffold the subsequent collaboration (häkkinen et al., 2017; koehler et al., 2020). At the core of problem-centered learning is collaboration occurring among learners and with the facilitator. Although intentional planning is necessary to establish the initial collaborative direction (ertmer & stepich, 2002; kanuka, 2011), the facilitator must work in meaningful ways when the interaction is occurring to extend the problem space coverage (ertmer & koehler, 2015). Facilitators must manage the group's collaboration, without dominating the conversation (yew & yong, 2014) and guide sensemaking through affirming ideas and prompting deeper consideration of key issues (ertmer & koehler, 2014, 2015; yew & yong, 2014). To bring closure to the learning experience, the facilitator should prompt students to share lessons learned relevant in future situations (tawfk & kolodner, 2016). Finally, the facilitator is responsible for evaluating the resulting learning and developing measures representative of the problem-solving process (jonassen, 2011). A combination of measures can provide a full consideration of a learning experience: peer evaluation forms for gauging collaboration, reflections and rubrics for self-assessment, mapped discussion of coverage of group interactions, and rubrics considering the development and quality of artifacts generated from the problem-solving experience (ertmer & koehler, 2014; jonassen, 2011; rico & ertmer, 2015). Educators use several strategies to support students' problem-finding activities during problem-centered learning experiences: prompting students to consider problem elements,

### **Social media**

Social media have become an important mediator of human experience, social interaction, and environmental realities (deaton, 2015). In recent years, educators have increasingly explored social media as a tool to facilitate teaching and learning (brown & green, 2015; dennen, 2018; dennen & rutledge, 2018), which has simultaneously stimulated researchers to investigate social media's role in teaching and learning (raut & patil, 2016; selwyn & stirling, 2016). While no universally accepted definition of social media exists (tess, 2013; zhao et al., 2013), we define social media as internet-based technology supporting multimedia content (e.g., text, audio, video, still image, and animation) and interaction; includes synchronous (e.g., zoom), semi-synchronous (e.g., whatsapp), and asynchronous (e.g., discussion forums) communication; and promotes collaboration, information exchange, community formation, content creation, and self-expression (boyd, 2014; dennen, 2018; zhao et al., 2013). Through mobile devices, people can use social media anytime and anywhere (page, 2012). Greenhow and lewin (2016) suggest social media have three typical features: (a) they highlight individual preferences and activity through profile pages; (b) they allow connections among users, between users and information, and between users and locations to be seen (e.g., checking into a location), and (c) they can be updated "dynamically" with embedded content (e.g., videos). Some examples of social media include social networking sites (e.g., facebook), blogs (e.g., wordpress), microblogs (e.g., twitter), wikis (e.g., pbworks), social bookmarking and tagging (e.g., diigo), media sharing (e.g., youtube), electronic notepads (e.g., evernote), collaborative word processing (e.g., google docs), idea management and mapping (e.g., wridea), and animation tools (e.g., powtoon) (koehler & ertmer, 2016; koehler et al., 2017; scott et al., 2016). Social media tools are constantly being created and evolving (boyd, 2014; obar & wildman, 2015; tess, 2013). With several social media tools available, educators have many potential options for developing new skills and knowledge (reiser, 2018).

### **Challenges with integrating social media for educational purposes**

Believing social media automatically improves education is misleading. Simultaneously, blaming social media for all problems of humanity is inaccurate. These extreme approaches to social media "assume that technologies possess intrinsic powers that affect all people in all situations the same way" (boyd, 2014, p. 15). However, technology's "pros and cons" create a complex interaction between people and social media (boyd, 2014, p. 16). In educational settings, teachers must be aware of the benefits of each technology, as well as the disadvantages, as their use can create challenges for parents, educators, and scholars (boyd, 2014). First, social media feeds are constantly updated with member activity. This intense flow of messages, photos, videos, and links can be overwhelming for learners, leading to cognitive overload (see hsu, 2015; huang et al., 2013; yen et al., 2015). Cognitive overload

can especially be an issue when using social media to solve complex problems (koehler et al., 2017). Second, learners using social media must discern quality as they locate information. Social media amplify the circulation of “misinformation (inaccurate information) and disinformation (deceptive information)” (karvola & fisher 2013, para. 1). Social media users can find “too much information, and (...) irrelevant, conflicting, outdated, and noncredible information” (sin, 2016, p. 1794). As social media have shifted the role of users from consumers to producers of knowledge (obar & wildman, 2015), anyone can create content for self-seeking purposes. Students from middle school to college have difficulty determining the credibility of information shared online (mcgrew et al., 2017). Third, instructional social media use may lead to distractions for learners (e.g., students check facebook notifications during class, fried, 2008). Multitasking behavior is detrimental to students’ learning processes (demirbilek & talan, 2018; karpinski et al., 2013; van der schuur et al., 2015), as they attempt to engage with course and non-course-related activities simultaneously and increase their cognitive load (kirschner & van merriënboer, 2013). Fourth, integrating social media for educational purposes creates challenges with managing boundaries between personal and formal spaces, specifically regarding student-instructor relationships (mcewan, 2012). Although social media offer instructors and students opportunities to build relationships, maintaining privacy is important (owen & zwahr-castro, 2007). As social media preserve interactions and shared information (boyd & ellison, 2008), political views, religious beliefs, and personal activities potentially become available to an entire class, leading to feelings of confusion, discomfort, and embarrassment (mcewan, 2012; owen & zwahr-castro, 2007). The blurry boundaries between what is private and public on social media can also create serious professional consequences for teachers exhibiting behavior deemed as inappropriate (e.g., posting pictures while holding a gun, koehler & besser, 2020)

Table 1. Description of social media articles

Social media	Study purpose	Method	Key findings
Content Acquisition Podcasts (Kennedy et al., 2014)	"Extend a program of research regarding a multimedia-based instructional tool called Content Acquisition Podcasts (CAPs)" (p. 117)	<b>Quantitative</b> 164 preservice teachers enrolled in an introductory course in special education. The experimental group received instruction using CAPs, and the control group had access to textbooks, a graphic organizer, and outline of main content	When comparing the posttest of the two groups, the participants in the experimental group (Course Content Area 1: $M=12.4$ , $SD=1.89$ ; Course Content Area 2: $M=13.9$ , $SD=.99$ ) achieved significantly higher scores than the participants from the control group (Course Content Area 1: $M=10.2$ , $SD=2.15$ ; Course Content Area 2: $M=12.0$ , $SD=1.98$ ). Course Content Area 1: $F(1,156)=43.10$ , $p>.001$ , $d=1.09$ and Core Course Content Area 2: $F(1,150)=57.66$ , $p>.000$ , $d=1.21$ , suggesting that CAPs supported preservice teacher learning content about key course topics.
Facebook (Stewart & Gachuga, 2016)	Investigate how a digital storytelling activity conducted in a private Facebook group influenced students' "critical awareness and social consciousness regarding notions of 'self' and 'other'" (p. 528)	<b>Qualitative</b> 25 American undergraduate students and approximately 40 South African undergraduate students	The use of Facebook for digital storytelling allowed students from both countries to overcome the stereotypes they had about each other as they recognized similarities between them, created an opportunity for friendships, provided a space for students to post their opinions regarding social and political topics, and stimulated students to include emotion in their stories.

Table 2. (continued)

Social media	Study purpose	Method	Key findings
Discussion Forums (Tan, 2017)	Investigate the interactions among students from a writing class in an online discussion forum while completing a paraphrasing assignment	<b>Qualitative</b> 43 English as second language undergraduate students from a Malaysian university	The use of discussion forums to complete the paraphrasing assignment allowed students to share their answers, comment on classmates' contributions and receive comments, reflect upon feedback, and present what they learned, repeating their answers with corrections—promoting self-directed and self-regulated behaviors. Through these interactions, most students provided interpretations and suggestions regarding classmates' paraphrasing and evaluated the content, vocabulary, and grammar.
Podcasts (Shariq & Manthirahandh, 2016)	Investigate the effects of listening to podcasts compared to listening to audio programs on students' self-regulation and their perception of the use of podcasts for educational purposes	<b>Mixed Methods</b> 54 female English as a foreign language (EFL) students from an Iranian language institute The experimental group listened to podcasts, and the control group listened to audio programs After listening to either the podcast or audio program, both groups completed it, summarized it, and discussed it with the whole class	The use of podcasts showed a positive effect on students' self-regulation. When comparing the posttests of these two groups, the participants in the experimental group achieved significantly higher scores than the participants from the control group, $t(52)=3.45$ , $p<.001$ , suggesting that the podcast had a greater effect on EFL students' self-regulation. The results also showed that the students who listened to the podcasts had positive perceptions of the use of podcasts for educational purposes.

Table2 (continued)

Social media	Study purpose	Method	Key findings
Mobile Messaging (Lee & Kim, 2016)	Investigate the effect of Kakao-Talk, a mobile messaging tool, on students' English writing skills (with 10-month, 12-month, and 15-month students) to understand the effects of Kakao-Talk on students' affective outcomes	Mixed Method ① Undergraduate students from a South Korean university	The use of Kakao-Talk improved writing with the 10-month of students with a low level of English proficiency. The results showed that the use of Kakao-Talk was effective in increasing students' writing scores ( $M = 12.79$ , $SD = 9.82$ ) in comparison with control scores ( $M = 18.21$ , $SD = 11.11$ ). Participating in the activities via Kakao-Talk also allowed students to create a sense of presence, providing them with different challenges, and a feeling of efficacy.
Vlog (Debbag & Fidan, 2021)	Investigate the effectiveness of educational Vlogs on the motivational beliefs of trainee teachers	Mixed Method ① Trainee teachers from a Turkish university The experimental group created Vlog reflections of their practicum experiences, and the control group reflected by creating written reports	The use of Vlogs showed a positive effect on the self-efficacy of trainee teachers' motivational beliefs. The participants in the experimental group achieved significantly higher scores on the posttest than the participants from the control group for intrinsic goal orientation ( $t = 7.21$ , $z = -5.34$ , $p < .05$ , $r = .70$ ), task value ( $t = 11.0$ , $z = -4.57$ , $p < .05$ , $r = .61$ ), control beliefs ( $t = 10.63$ , $z = -4.64$ , $p < .05$ , $r = .63$ ), self-efficacy ( $t = 9.0$ , $z = -4.89$ , $p < .05$ , $r = .65$ ), and lower scores for extrinsic goal orientation ( $t = 17.5$ , $z = -3.47$ , $p < .05$ , $r = -.46$ ). Participants from the experimental group identified benefits (e.g., self-regulation and interaction) and challenges (e.g., technical problems and time-consuming) of using Vlogs.

## II. Educational affordances of social media

Social media applications are constantly being created, updated, and discontinued (dennen, 2018). Although educators have many options when designing learning experiences, selecting the most appropriate tool can be challenging if teachers focus on each property of a given tool and miss a clear connection to their context or audience. To overcome these challenges, an alternative approach is to focus on the affordances of a given technology. Broadly, affordances have been conceptualized as “relations between the abilities of organisms and features of the environment” (chemero, 2003, p. 189). Considering the definition of affordance more deeply reveals that affordances for an object vary depending on the organism involved and a given environment: for example, a rock can provide shelter to an ant or serve as a weapon for humans (gibson, 1986). Therefore, affordances are not “properties” of a given environment, but rather the relationships among these different components determine the affordances for an object in a specific situation (chemero, 2003). According to greeno (1994), gibson’s intention was that the affordance is a property of whatever the person interacts with, but to be in the category of properties we call affordances, it has to be a property that interacts with a property of an agent in such a way that an activity can be supported. (p. 340) greeno used the term ability to indicate “whatever it is about the agent that contributes to the kind of interaction that occurs” (p. 340), discussed the intrinsic relationship between affordances and abilities, and believed establishing an affordance without determining the ability of the agent interacting with the environment is not possible. Additionally, he argued, “an ability depends on the context of environmental characteristics, or that an affordance depends on the context of an agent’s characteristics” (greeno, 1994, p. 340). Therefore, suggesting a car affords driving is inappropriate as this affordance exists in relation to a person who knows how to drive. For individuals lacking the ability to drive, cars do not afford driving but might afford transportation. Finally, affordances are not dependent on the agent’s perception of the affordance or motivation to engage in an activity (gibson, 1986; greeno, 1994). Using social media as an example, twitter affords publicity to musicians and connections between graduate students and scholars worldwide. Assuming both musicians and graduate students can write, they might use other tools (e.g., microsoft word) to compose songs and dissertations. The fact that a musician does

not identify twitter as a medium to publicize their new album or chooses not to publicize it on twitter does not mean twitter does not afford the singer publicity. However, if the singer chooses microsoft word to publicize their new album, publicity is unlikely because this tool does not afford publicity. Considering social media affordances used by teachers and students in educational settings allows these agents to move past individual applications to focus on utility to consider and accomplish instructional goals. Across literature on social media for educational

**Table 3** Articulated social media affordances

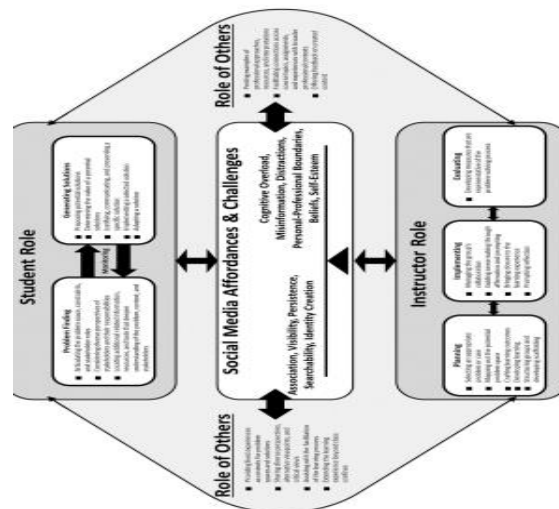
Source	Affordances	Context	Tool(s)
Tivem and Leonard (2013)	Viability Edibility Persistence Association	Organizational communication	Social Media (blogs, wikis, Applications, social tagging)
Boyd (2014)	Persistence Viability Searchability	Networked public / general use	Social Network Sites
Rice et al. (2017)	Persuasiveness Edibility Self-presentation Searchability Viability Awareness	Organizational communication	Information and communication (ICTs)—computer conferencing, online bulletin boards, e-mail, support systems, voice mail, conferencing, virtual collaboration, mobile phones, and (organizational media)
Jin (2017)	A casual space with easy access to native speakers of Chinese Authentic meaning-focused communication with native speakers of Chinese Linguistic resources and multiliteracies Space for new identity creation	Chinese as a second language	WeChat
Steeffle et al. (2011)	Direct social cues (social awareness, feedback, prompts) Structures (representations and content, profiles, blogs, wikis) Communication and Functions (communication, coordination, task support)	Motivational studies	Social mediating technology Wikipedia, Blackboard, Ebb World of Warcraft

### III. Association

Social media afford learners opportunities to connect or associate with other individuals or information (jin, 2018; koehler et al., 2017; manca & ranieri, 2016; tur & urbina, 2014; xue & churchill, 2019). These connections and associations can potentially take many forms: interactions and collaborations between learners and others (e.g., peers, instructors, experts) and between learners and diverse contexts (e.g., informal, non-native); educational resource sharing in diverse and integrated formats (e.g., integration of platforms in one place—youtube shared via facebook for discussion); and interactions and resources shared with enhanced connections (e.g., geotagged photos can be located and discussed). While on the surface connecting learners to others and information does not seem novel, the way social media can potentially facilitate these interactions offers unique opportunities for negotiating learning experiences. First, social media offer educators and learners ways to connect with authentic contexts (e.g., communicating with native speakers when learning a new language, jin, 2018; xue & churchill, 2019), informal learning environments (e.g., connecting instructors and students through more casual means—news sources, podcasts, etc., xue & churchill, 2019), geographically separated experiences (e.g., “providing a google maps link to the actual location of the recorded event,” cochrane & bateman, 2010, p. 6), and hybridized expertise (e.g., contributions “of current and past learners, practicing professionals and other teachers, can encourage the development of social capital,” manca & ranieri, 2016, p. 504). Through these connections, experiences are not limited to the classroom, and learners’ awareness increases (e.g., language, resources, terminology, digital competence, tur & urbina, 2014). Second, many applications (e.g., google suite) allow users to invite contacts to collaborate (zawawi et al., 2017) and support simultaneous access of resources and information to co-create and revise (e.g., collaborating via google doc, bower, 2016). Collaboration



via social media is also enhanced by combining information with learning resources: mixing “instructional material with information and knowledge sources that, produced elsewhere and available through several channels, influence the design and the delivery of the learning experience” (manca & ranieri, 2016, p. 504). Third, connections and associations via social media occur immediately (xue & churchill, 2019), with ease (with limited effort users can “spread information, whether by explicitly or implicitly encouraging the sharing of links,” boyd, 2014, p. 12), and in many different formats (e.g., 216 a. A. Koehler, d. R. Vilarinho-pereira 1 3 text, video, audio, bower, 2016), at diverse times (e.g., a synchronous online meeting versus analyzing an asynchronous image in a discussion forum, bower, 2016), and directly or indirectly (e.g., “directly via im and e-mail plus interaction via avatars and indirectly through individual profiles,” sutcliffe et al., 2011, p. 1056). Finally, the potential of amplification of associations, interactions, and connections is great when using social media due to openness and mass sharing: recording and broadcasting live events, using qr codes to connect to information, and creating rss feeds (bower, 2016; tur & urbina, 2014).



**Table 5** Affordance-based opportunities for supporting problem solving Social media affordances

Affordance	Opportunities for supporting problem finding	Opportunities for supporting generating solutions	Opportunities for supporting evaluating
Association	<p><b>Articulating the problem space, re-examining, and redefining the problem</b></p> <ul style="list-style-type: none"> <li>Using social media to explore a problem and its context</li> <li>Asking learners to share examples of and personal experiences with similar problems</li> <li>Considering diverse perspectives of stakeholders</li> <li>Interpreting profiles of individuals in professional roles similar to those in the problem (e.g., a teacher or a parent) to understand the problem in their own words</li> <li>Using social media to connect with individuals in the problem being considered in different forms and from different sources in a common space (through both student-led and instructor-led activities)</li> <li>Using social media to inform others, resources and</li> </ul>	<p><b>Proposing potential solutions</b></p> <ul style="list-style-type: none"> <li>Considering solutions of similar problems covered in social media</li> <li>Researching recommendations and content online for re-examining common concerns for a given problem or industry through both academic and instructional activities</li> <li>Asking peers and experts within generating solutions</li> <li>Asking peers and experts to evaluate proposed solutions</li> <li>Using social media to connect with individuals in the problem being considered in different forms and from different sources in a common space (through both student-led and instructor-led activities)</li> <li>Using social media to inform others, resources and</li> </ul>	<p><b>Overseeing with professionals to evaluate their problem finding and generating solutions</b></p> <ul style="list-style-type: none"> <li>Using social media to connect with individuals in the problem being considered in different forms and from different sources in a common space (through both student-led and instructor-led activities)</li> <li>Using social media to inform others, resources and</li> </ul>

IV.CONCLUSION

Teachers are increasingly utilizing social media platforms effectively to accomplish various educational objectives. Although the use of technology to foster problem-solving abilities in learners is not a novel technique, social media presents fresh and captivating options for educators seeking to involve learners in the analysis of intricate practical challenges. In order to increase the likelihood of success in teaching problem-solving skills, educators should purposefully incorporate social media into their teaching and learning activities. This can be achieved by choosing a problem-centered approach that is effective, focusing on specific phases of problem-solving and employing a meaningful strategy. Educators should also identify the features of social media that can support the chosen strategy, while also considering the challenges associated with using social media and the potential role of others in the process. By following these steps, learners' ability to identify problems, generate solutions, and monitor their progress can be meaningfully supported. Further investigation is required to examine the potential of utilizing social media to facilitate and improve problem-centered learning experiences. Undoubtedly, the literature contains several examples that are more effective but not easily found. For example, when learners are honing their language abilities or creating industrial design drawings, these serve as specific illustrations of problem-solving. Nevertheless, the specific talents that are the focus of these study are not explicitly identified. In order to investigate the influence of affordance-based approaches on the development of problem-solving skills in learners, researchers should conduct comparisons between environments that are enriched with social media affordances and those that provide different types of support (such as non-digital scaffolds or other technologies). It is also important to consider how different affordances facilitate specific problem-solving behaviors. Further research is required to investigate the decision-making process of educators when choosing social media features, as well as the challenges they face in supporting problem-solving. Additionally, it is important to explore effective methods of supporting and training educators to effectively utilize social media features in order to enhance the development of problem-solving skills. Like any other advancements, the rise of social media has brought about distinct challenges. Many of these difficulties stem from users' inadequate capacity to efficiently control the influence derived from the capabilities provided by social media. While educators should be aware of the difficulties involved in incorporating social media into education, it is worth exploring the potential benefits it offers, such as fostering connections, increasing exposure, preserving information, facilitating searchability, and shaping identity. These advantages can be utilized to promote the construction of complex and open-ended tasks. By incorporating these tools into the problem-solving process, educators can assist learners in cultivating their digital literacy abilities, enabling them to effectively utilize social media for academic reasons and navigate their personal and professional life with success.

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