Review article

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Is Facebook still a suitable technology-enhanced learning environment? An updated critical review of the literature from 2012 to 2015

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Abstract This study provides an updated critical review of the literature on Facebook as a technology-enhanced learning environment based on papers published between 2012 and 2015. It adopts a revised classification of the categories identified in a previous study, which emphasized three main Facebook affordances – mixing information and learning resources, hybridization of expertise and widening context of learning. The aim is to investigate to what extent studies using Facebook as a learning environment exploited these affordances. Literature has been also analysed according to three types of educational use of Facebook – formal use in formal learning settings (FUF), informal use in formal learning settings (IUF) and use in informal learning settings (UI) – to highlight if and how Facebook affordances have been exploited in these learning settings. Literature search identified 147 articles published in peer-reviewed journals. The results show that most of the articles can be classified as dealing with FUF ($N=69$; 46.9%) or as IUF ($N=68$; 46.3%); only a minority concerns the UI ($N=10$; 6.8%). Overall, the study found that Facebook pedagogical affordances are still partially implemented, although different types of educational use of Facebook exploit these affordances to different degrees. It also provides indications for future research.

Keywords Facebook, formal–informal learning, higher education, out-of-school, professional development, secondary education.

Introduction

In recent years a number of reviews of the literature on the use of social network sites in education have been published (Aydin, 2012; Gao, Luo, & Zhang, 2012; Greenhow & Askari, 2015; Greenhow, Gleason, & Li, 2014; Hew, 2011; Manca & Ranieri, 2013; Rodríguez-Hoyos, Haya Salmón, & Fernández-Díaz, 2015; Yang et al., 2011). While most focused on educational use of Facebook (Aydin, 2012; Hew, 2011; Manca & Ranieri, 2013; Yang et al., 2011), other studies investigated global social network site use for educational purposes (Rodríguez-Hoyos et al., 2015), among youths (Greenhow et al., 2014) or in K-12 related education (Greenhow & Askari, 2015). One study was focused on Twitter as a micro-blogging service in education (Gao et al., 2012).

Today Facebook counts on 1.59 billion monthly active users (Facebook, 2015) and still stands as the most popular social network site. The availability of many reviews of Facebook is due to the great popularity this social network site has also gained among scholars and educational practitioners. Educators and instructors, especially in the higher education sector, continue to be interested in investigating Facebook

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for learning and as an instructional tool (Kent & Leaver, 2014).

However, apart from the study carried out by Manca and Ranieri (2013), none of the reviews deals with the use of Facebook as a technology-enhanced learning environment. In that study, the authors highlighted a number of pedagogical affordances of Facebook: (1) the possibility of mixing different information and learning resources, such as the combination of 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; (2) the possibility of hybridizing different expertise, through which peripheral and emergent interactions occurring on networks by means of the contribution of current and past learners, practicing professionals and other teachers, can encourage the development of social capital; and (3) the possibility of widening the context of learning, where learners and instructors share personal and professional interests and aspirations, thus mixing different contexts of learning and social and personal life. Manca and Ranieri (2013) pointed out that Facebook affordances were in fact rarely exploited. They also stated that obstacles like declared and implicit institutional policies, teachers' and students' pedagogies and cultural issues, may prevent a full adoption of Facebook as a learning environment.

This study extends the results of that review by examining 147 papers published between 2012 and 2015. It takes into account a number of variables, such as the geographical distribution of the learning experiences, the aim and the methodology employed in the studies, the reasons why Facebook was adopted as a learning environment and which Facebook features were mainly used. The study also analyses the published literature according to three types of educational use of Facebook: formal use in formal learning settings, informal use in formal learning settings and use in informal learning settings. The aim is to investigate if and to what extent Facebook affordances have been exploited according to the three types of learning settings.

In the following, the rationale of the study and the methodological approach are presented. The results of the study are provided along with implications for further research, with specific reference to literature gaps.

Rationale of the study

The objective of the study is to analyse Facebook as a technology-enhanced learning environment in different educational contexts, with the aim of investigating whether and to what extent the pedagogical affordances of Facebook identified in previous literature (Manca & Ranieri, 2013) are exploited in the different types of learning settings, ranging from strictly formal (e.g., secondary education, higher education and teacher education) to totally informal (e.g., out-of-school, professional development, civic associations or cultural clubs).

The literature that distinguishes between formal and informal learning is quite abundant (Colley, Hodkinson, & Malcolm, 2003; Greenhow & Lewin, 2016; Livingstone, 2001; Malcolm, Hodkinson, & Colley, 2003; Werquin, 2010). Formal learning is usually considered a learning experience supported by an educational institution, structured (in terms of learning objectives, learning schedule or learning content), controlled by a teacher and resulting in a certificate (Werquin, 2010). On the contrary, informal learning is mainly defined in contrast to formal learning. It is supposed not to be supported by an educational institution, not based on a predefined structured curriculum, or not resulting in a certificate (Werquin, 2010). In line with this approach, Livingstone (2001), for instance, suggests a generic nominal definition of informal learning according to which informal learning is 'any activity involving the pursuit of understanding, knowledge or skill which occurs without the presence of externally imposed curricular criteria' (p. 4). Analysis of formality and informality has led, for instance, to developing guidelines to validate non-formal and informal learning, such as those identified by the European Commission (Cedefop, 2015).

However, clear-cut distinctions have been increasingly questioned as it seems progressively complicated to characterize learning according to distinct and separate attributes. For example, Vavoula and Sharples (2009) question whether students visiting a museum (a context considered as an informal learning setting) within school activities (a formal learning setting) is a case of formal or informal learning.

Other authors suggest that formality and informality should be considered as a continuum or as inextricably interrelated (Colley et al., 2003; Greenhow & Lewin, 2016; Malcolm et al., 2003). For instance, Malcolm

et al. (2003) argue that 'all (or almost all) learning situations contain attributes of formality/informality, but the nature of, and balance between them varies significantly from situation to situation' (p. 317). The authors (Colley et al., 2003) also suggest considering four aspects of formality/informality: the learning process (that may be incidental to everyday activities or teacher-controlled, either assessment may be absent or predominantly formative and negotiated), the location and the setting (either the physical location or the setting of learning), the purposes (whether learning is the primary and deliberate focus of activity or it is an unintended outcome of a primary activity) and the content (this may be related to established expert knowledge or to everyday practice and workplace competence). Attributes of formality/informality are interrelated in different ways in different learning situations and are closely related to the social, political and cultural contexts where learning occurs.

In a similar vein, Greenhow and Lewin (2016) argue that learning should be conceived with varying attributes of formality and informality. They develop Colley et al's model (2003) by suggesting sub-categories for each attribute. Examples are as follows: learning as primary purpose vs. learning as unintended outcome (purpose); teacher-initiated and teacher-led vs. incidental, experiential and self-directed (process); teachers as authority vs. democratization of expertise (process); knowledge acquisition vs. everyday practice (content); time-restricted or open-ended activities (location/context); and specific outcomes rigid vs. specified outcomes flexible or serendipitous (content). Identifying learning experiences that are somewhere along the formal/informal continuum can be challenging. However, identification has important implications especially for learning design and assessment.

Following this approach, we classified the studies according to varying degrees of formality/informality. We speculated on three main approaches to the educational use of Facebook: the first considers Facebook as a formal learning environment in formal learning settings; in the second Facebook is evaluated as an informal learning environment in formal learning settings; and the third considers Facebook as a learning environment in informal learning settings. When Facebook is used as a formal learning environment, such as in schools or higher education, it is mainly conceived as a platform to deliver pre-structured learning content based on pre-definite learning objectives, and activities are initiated and/or led mainly by teachers. When Facebook is used as an informal learning environment, the learning content is not necessarily pre-structured, the learning objectives may be negotiated with learners, and the activities may be led by the learners themselves. These situations may occur in formal learning settings such as classrooms or lecture halls. Finally, Facebook can be used in informal settings such as pre-schools or professional development.

We analysed and classified the studies according to these different Facebook uses (formal use in formal settings of learning, informal use in formal settings of learning and use in informal settings of learning) with the aim of contributing to the current debate around opportunities and challenges of bridging formal and informal learning in technology-enhanced learning environments. Moreover, Facebook affordances – mixing information and learning resources, hybridization of expertise and widening context of learning – as stated in Manca and Ranieri's study (2013), were sought with the aim of investigating if and to what extent they are implemented and exploited in the learning situations according to different degrees of formality and informality.

Methodology

Materials and method

Articles were selected according to a number of criteria: (1) studies that specifically investigated Facebook as a technology-enhanced learning environment; (2) studies that reported empirical findings about the effectiveness or evaluation of Facebook use; and (3) articles published in peer-reviewed English language academic journals.

Conference proceedings, unpublished manuscripts, research abstracts, dissertation and position papers were excluded. Despite publications of such type being able to offer well-documented research with supported findings, theories and evidence, peer-reviewed academic journals are supposed to assure higher quality publications. Moreover, because the review was primarily concerned with the state of empirical research in the area, studies that were more conceptual in nature or those with little evidentiary support were also ignored. Finally, only papers that presented a clear statement of research questions, claims and interpretations grounded

in evidence and theory, as well as careful documentation of all procedures, were included (Freeman et al., 2007).

To collect the corpus of the study, extensive research was conducted using the keyword 'Facebook' with English as the language of the articles and according to the 2012–2015 timespan.

The search was carried out in the following sources: (1) a number of electronic databases (Education Resources Information Center – ERIC, Education Research Complete – ERC, Web of Science, Scopus); (2) a list of journals regarding educational research, educational technology and technology-enhanced learning not indexed in the aforementioned sources (*Cypriot Journal of Educational Sciences; eLearning Papers; International Journal of Adult Vocational Education and Technology; International Journal of Bias, Identity and Diversities in Education; International Journal of Computer-Assisted Language Learning and Teaching; International Journal of Cyber Ethics in Education; International Journal of E-Learning & Distance Education; International Journal of Innovation in Education; International Journal of Interactive Communication Systems and Technologies; International Journal of Interdisciplinary Telecommunications and Networking; International Journal of Online Pedagogy and Course Design; International Journal of Social and Humanistic Computing; International Journal of Social Media and Interactive Learning Environments; International Journal of Space-Based and Situated Computing; International Journal of Technology and Educational Marketing; International Journal of Virtual Communities and Social Networking, Knowledge Management & E-Learning: An International Journal; World Journal on Educational Technology*).

The use of these databases was considered sufficient and reasonable as they are the most prominent reference sources in academic institutions. Moreover, because one of the aims of the study was to provide an updated review of the literature, the authors were supposed to rely on the same sources and the same selection criteria used in the previous study (Manca & Ranieri, 2013) for comparison reasons.

Despite the fact that seeking these sources might produce duplicate results, the search facilities generate different outcomes because databases operate on diverse parameters (e.g., some do not host articles in press or in the iFirst list), or many educational technology-related journals are not indexed in the most popular databases (e.g., Thompson Reuters). Others (e.g., ERIC) index papers only through a few fields (title, author, descriptors and keywords) and omit results contained in the full text.

Except for ERIC and ERC, specifically devoted to education resources, the remaining databases were consulted according to selection criteria like subject areas (Social Sciences and Arts and Humanities) or Categories (e.g., Educational research).

As of 15 October 2015, the searches yielded a number of articles distributed as follows: (1) ERIC: 373 papers; (2) ERC: 1125 papers; (3) Web of Science: 2234 papers; (4) Scopus: 2413 papers; and (5) list of journals: 7 papers. Papers published in 2012 that were considered in the 2013 survey (Manca & Ranieri, 2013) were excluded. Out of the papers found in the four databases, 142 were selected for review as they fit the topic and the aims of the research; five further articles were identified through the additional list of journals. The total was 147 papers.

Procedure and data analysis

A random sample of 50 papers was read independently by the two authors and analysed according to a list of guidelines. These guidelines were primarily derived from Manca and Ranieri's study (2013). The purpose was to verify whether the original guidelines were convenient for the corpus of data. A Grounded Theory approach (Strauss & Corbin, 1998) within an iterative process of qualitative content analysis was adopted. As a result, a number of accommodations and additions were made to adapt the guidelines to the instances provided by the corpus of papers and to the aims of the study. Examples of modification are the context of the study, which expanded formal and informal learning situations, and Facebook reasons, which included the 'pedagogical reasons' option when these were explicitly stated or easily inferable.

The definite list of guidelines is as follows:

- author(s) and year of publication
- geographical area
- setting of the study (primary education, secondary education, higher education, teacher education, out-of-school and professional development)

- aim of the study (evaluate the efficacy of Facebook as an instructional tool, explore the use of Facebook as a supportive and interactive tool for learning, and investigate students' reactions to Facebook as an instructional tool)
- research design and methods (quantitative method, qualitative method, and mixed approach)
- Facebook feature (profile, group, page, chat, event, application, and API)
- Facebook usage (discussion and peer learning/assessment, content development, content delivery, sharing resources, and support self-organized learning)
- Facebook reasons (pedagogical reasons, popularity and familiarity among young people, matching millennial learners' expectations, external pressures for innovation, and bridging formal and informal learning)
- main findings

Moreover, studies were analysed to find out whether they exploited Facebook affordances: mixing information and learning resources, hybridization of expertise and widening context of learning.

After having agreed on the new set of guidelines, the authors worked independently of each other and applied the same set of guidelines to the entire corpus of papers. From the calculation of index of reliability (Capozzoli, McSweeney, & Sinha, 1999), acceptable outcomes resulted in a percent agreement of 0.95. Disagreements were resolved through discussion, and a consensus was reached.

The final step of the analysis concerned the classification of the studies according to the formality/informality of the learning situation. The authors took into account a number of elements to guide the classification, such as the level of content structure, formative or summative assessment procedures, content related to the curriculum subjects, teacher-led or student-led initiatives, specified learning objectives and outcomes, location and setting. A random sample of 40 papers was used to verify whether the model was convenient for the corpus of data. After having agreed on the classification criteria, the authors worked independently of each other and applied the same criteria to the entire corpus of papers. From the calculation of index of reliability (Capozzoli et al., 1999), acceptable outcomes resulted in a percent agreement of 0.90. Disagreements were resolved through discussion, and a consensus was reached.

Quantitative results

In this section quantitative results about demographics of the studies in relation to the three typologies of use are presented. Qualitative analyses of the reasons that led to the choice of Facebook as learning environment, along with the main results, the analysis of Facebook affordances and of cultural issues, are reported in the following sections.

Demographics of the studies

Among the papers selected for review, 69 (46.9%) were coded as studies on the formal use of Facebook in formal learning settings (FUF), 68 (46.3%) as informal use in formal learning settings (IUF) and 10 (6.8%) as use in informal learning settings (UI).

As far as temporal distribution is concerned, most of the studies were published in 2014 and 2015. However, despite the ever growing interest in the topic, we cannot claim an increasing trend because journals adopt different publication policies that can result in short or long delays in publication.

In terms of geographical distribution, the majority of the FUF studies were carried out in Asia ($N=28$), the Middle East ($N=13$), Europe ($N=11$) and North America ($N=10$). IUF studies were mostly reported in Asia ($N=21$), North America ($N=14$), Europe ($N=14$) and the Middle East ($N=11$). Lastly, half of the UI studies ($N=5$) were carried out in Asian countries and almost the other half in North America ($N=4$).

As for the contexts and settings of the learning experiences, most of the FUF studies were conducted in higher education contexts ($N=53$), a few in the field of teacher education ($N=11$) and a small number in secondary education ($N=4$). The majority of the IUF studies concern experiences that occurred globally in higher education ($N=45$) and teacher education ($N=14$); only a minority were carried out in secondary schools ($N=9$). The majority of the UI studies ($N=7$) were related to out-of-school learning, while a few ($N=3$) fell into the category of professional development.

With reference to the aims of studies, almost all the FUF studies aimed at evaluating the efficacy of Facebook as an instructional tool ($N=58$), while a few ($N=11$) investigated students' perceptions and reactions to the use of Facebook as a learning environment. The main aim of the IUF studies was to explore the use of

Facebook as a supportive and interactive tool for learning ($N=53$), while a few ($N=15$) investigated students' perceptions related to the experience of use. Lastly, all the UI studies aimed at exploring the use of Facebook as a supportive and interactive tool for learning.

In FUF studies, different methods were adopted to investigate the topic. Experimental or quasi-experimental design prevailed with the administration of pre-test and post-test to experimental and (non-)randomized control groups; quantitative tools such as questionnaires and surveys, statistics on usage and content analysis of posts were also used. Qualitative-based research approaches included action research, ground theory, design based research, virtual ethnography and discourse analysis.

IUF studies were carried out mainly through quantitative methods such as survey tools, statistics on participants' patterns of use and quantitative content analysis of posts. Qualitative approaches included participants' reflection journals, virtual ethnography methods and focus groups interviews.

Lastly, UI studies were carried out according to quantitative methods, like quantitative content analysis of posts; qualitative analysis, such as qualitative content analysis and focus group interviews; or a combination of the two.

Table 1 presents the demographics of the three typologies of studies.

Facebook features, use and reasons

Analysis of Facebook features shows that, in FUF studies, the most commonly used was the group ($N=54$), while the use of pages ($N=9$) or apps ($N=5$) was much

Table 1. Demographics of the Studies

		Formal use in formal learning settings		Informal use in formal learning settings		Use in informal learning settings		TOT	
		N	%	*N*	%	*N*	%	*N*	%
No. of studies		69	46.9	68	46.3	10	6.8	147	100.0
Year	2012	14	20.3	9	13.2	3	30.0	26	17.7
	2013	19	27.5	10	14.7	0	0.0	29	19.7
	2014	19	27.5	26	38.2	4	40.0	49	33.3
	2015	17	24.6	23	33.8	3	30.0	43	29.3
Geographical area[a]	North America	10	14.5	14	20.6	4	40.0	28	19.0
	South America	0	0.0	5	7.4	0	0.0	5	3.4
	Europe	11	15.9	14	20.6	2	20.0	27	18.4
	Middle East	13	18.8	11	16.2	0	0.0	24	16.3
	Africa	4	5.8	4	5.9	1	10.0	9	6.1
	Asia	28	40.6	21	30.9	5	50.0	54	36.7
	Australia	5	7.2	8	11.8	0	0.0	13	8.8
Setting	Primary education	1	1.4	0	0.0	—	—	1	0.7
	Secondary education	4	5.8	9	13.2	—	—	13	8.8
	Higher education	53	76.8	45	66.2	—	—	98	66.7
	Teacher education	11	15.9	14	20.6	—	—	25	17.0
	Out-of-school	—	—	—	—	7	70.0	7	4.8
	Professional development	—	—	—	—	3	30.0	3	2.0
Aims	Evaluate the efficacy of Facebook as an instructional tool	58	84.1	—	—	—	—	58	39.5
	Explore the use of Facebook as a supportive and interactive tool for learning	—	—	53	77.9	10	100.0	63	42.8
	Investigate students' reactions to Facebook as an instructional tool	11	15.9	15	22.1	0	0.0	26	17.7
Research method	Quantitative method	37	53.6	26	38.2	4	40.0	67	45.6
	Qualitative method	10	14.5	19	27.9	3	30.0	32	21.8
	Mixed method	22	31.9	23	33.8	3	30.0	48	32.7

[a]The total number is more than 147 as the studies may have involved participants in more than one country.

less frequent. Also the majority of the IUF studies relied on group or page ($N=65$). Only a few ($N=3$) used already existing apps (e.g., FarmVille) or developed specific ones. Lastly, the group was the most frequent choice ($N=7$) also in UI studies, while two apps for environmental education were specifically developed and implemented in the studies.

As far as Facebook use is concerned, in FUF studies, Facebook was mainly adopted to conduct discussion and peer learning ($N=62$) or to share resources ($N=43$). However, the site was also used to support content development ($N=27$), comment on Internet information/texts or create new contents, and carry out content delivery activities ($N=20$). In IUF studies, Facebook was mainly used to conduct activities based on discussion and peer learning ($N=53$), sharing resources ($N=41$) or to support self-organized activities led by students although they were mainly teacher-initiated ($N=9$). Lastly, in UI studies, Facebook was chosen to support self-organized learning in all of the studies.

In terms of reasons for choosing Facebook as a learning tool, popularity and familiarity of Facebook among students ($N=33$) and pedagogical reasons ($N=33$) were most frequently reported in FUF studies. Pedagogical reasons ($N=29$) along with popularity and familiarity of Facebook among students ($N=26$) were the most recurrent reasons also in IUF studies. Lastly, in UI studies popularity and familiarity of Facebook among students ($N=5$) and pedagogical reasons ($N=3$) were most frequently reported.

Table 2 presents the quantitative data related to the features, use and reasons for Facebook use in the three typologies of studies.

Facebook affordances

Facebook affordances were differently exploited in the three typologies of studies. All three affordances were found significantly increasing along the continuum formality/informality. While mixing information and learning resources was exploited only in 37.7% of the FUF studies, almost all UI studies (80.0%) reported a combination of instructional material with information and knowledge sources produced elsewhere. The possibility of combining current and past learners,

Table 2. Facebook Features, Usage and Reasons

		Formal use in formal learning settings		Informal use in formal learning settings		Use in informal learning settings		TOT	
		N	%	*N*	%	*N*	%	*N*	%
No. of studies		69	46.9	68	46.3	10	6.8	147	100.0
Facebook feature[a]	Profile	2	2.9	1	1.5	1	10.0	4	2.7
	Group	54	78.3	50	73.5	7	70.0	111	75.5
	Page	9	13.0	15	22.1	1	10.0	25	17.0
	Chat	0	0.0	1	1.5	0	0.0	1	0.7
	Event	1	1.4	0	0.0	0	0.0	1	0.7
	App	5	7.2	3	4.4	2	20.0	10	6.8
	API	0	0.0	1	1.5	0	0.0	1	0.7
Facebook usage[a]	Discussion and peer learning/assessment	62	89.9	53	77.9	—	—	115	78.2
	Content development	27	39.1	9	13.2	—	—	36	24.5
	Content delivery	20	29.0	21	30.9	—	—	41	27.9
	Sharing resources	43	62.3	41	60.3	—	—	84	57.1
	Support self-organized learning	—	—	9	13.2	10	100.0	19	12.9
Facebook reasons	Popularity and familiarity among young people	33	47.8	26	38.2	5	50.0	64	43.5
	Pedagogical reasons	33	47.8	29	42.6	3	30.0	65	44.2
	Matching millennial learners' expectations	1	1.4	3	4.4	0	0.0	4	2.7
	External pressures for innovation	0	0.0	3	4.4	0	0.0	3	2.0
	Bridging formal and informal	—	—	3	4.4	—	—	3	2.0
	Not specified	2	2.9	3	4.4	2	20.0	7	4.8

[a]The total number may be more than 147 as the same paper could have been classified in more than one subcategory.

practicing professionals and other stakeholders was reported only by 8.7% of the FUF studies, compared with 70.0% of the UI studies. Finally, the possibility of mixing different contexts of learning and social and personal life was reported in only 21.7% of the FUF studies, in contrast with 100.0% of UI studies.

Overall the results show that almost half of the studies (47.6%) exploited the 'Mixing information and learning resources' affordance, while 'Widening context of learning' was exploited in 33.3% of the studies, and only 17.7% reported 'Hybridisation of expertise'. For a complete report of data, see Table 3.

Formal use of Facebook in formal settings of learning

Related literature

Social networking sites are engaging students and instructors with new teaching and learning practices. However, despite an increasing interest in these tools for educational purposes (Aydin, 2012; Gao et al., 2012; Greenhow et al., 2014; Hew, 2011; Manca & Ranieri, 2013; Rodríguez-Hoyos et al., 2015; Yang et al., 2011), there has been little integration of these sites into formal learning contexts. In higher education, learning management systems (LMS) such as Blackboard and Moodle are frequently used as technology-enhanced learning environments (Chen & Bryer, 2012; Petrovic et al., 2014). These tools are characterized by features that enable teachers to deliver course materials and students to carry out individual or collaborative academic tasks (Avgeriou et al., 2003). Although LMS have become relatively popular among academics (Prendes, 2009), they have also been questioned for several reasons. According to many authors (Jong et al., 2014; Conde et al., 2014, they are mainly focused on institutional needs and content delivery and do not support continuing education or integration of open technological devices like social media sites. Other scholars (Dron & Anderson, 2014; Siemens & Weller, 2011) claim that the adoption of Web 2.0 sites would allow academic institutions to overcome the several limitations of current LMS. The adoption of social media and social network sites would help transform teaching and learning practices into more social, open and collaborative sites, exploiting the principles of socio-constructivist learning and connectivism (Siemens & Weller, 2011). At the same time, other scholars have warned against the tensions that could arise when participatory-networked practices are incorporated into curriculum and school practices (Crook, 2012; Kirschner, 2015; Merchant, 2012).

According to Crook (2012), these tensions are related to reshaping the roles of teacher and student, to the diversity between the closed boundaries of school classes or lecture halls and the openness of social media, and to the relationship between individual and collaborative learning and their implications for assessment and learning styles. Merchant (2012) also warns against positions that extremely emphasize the popularity of social network sites among younger generations and their attitudes for formal or informal learning. Although many studies report the positive experience of young people's use of online social networking, we cannot have clear expectations of how these practices are interwoven with life offline.

With a specific focus on Facebook, Kirschner (2015) challenges the idea that Facebook may be adequate for learning purposes, particularly its adequacy to support argumentation, discussion and knowledge construction. There are at least three reasons why Facebook is a poor environment for fruitful argumentation and discussion. First, Facebook encourages narcissistic expressions, thus

Table 3. Facebook Affordances

	Formal use in formal learning settings ($N = 69$)	Informal use in formal learning settings ($N = 68$)	Use in informal learning settings ($N = 10$)	TOT
Mixing information and learning resources	26 (37.7%)	36 (52.9%)	8 (80.0%)	70 (47.6%)
Hybridization of expertise	6 (8.7%)	13 (19.1%)	7 (70.0%)	26 (17.7%)
Widening context of learning	15 (21.7%)	24 (35.3%)	10 (100.0%)	49 (33.3%)

not the best attitude if the aim is to construct knowledge with others. Second, Facebook connects users with similar thoughts and views, whereas to argue and discuss one needs contrasting opinions and points of view. Finally, its linear structure does not allow the building of argumentations that require the making of claims and justification based on evidence and inferential processes.

Reasons for use and results of the studies

While adopting Facebook because of its popularity and familiarity among young people is related to Facebook's appeal for new generations of learners, several pedagogical reasons justified the educational use of Facebook in a formal learning setting. A number of studies emphasized that Facebook provides students with an educational tool that enables peer feedback, communication, discussion and learning, and facilitates collaboration and learners' construction of knowledge through social interaction (Acar, 2013; Alias et al., 2013; Chen, 2015; Gregory, Gregory, & Eddy, 2014; Güler, 2015; Hou et al., 2015; Karal, Kokoc, & Cakir, 2015; Kurtz, 2014; McCarthy, 2015b; Miller, 2013; Öztürk, 2015; Puhl, Tsovaltzi, & Weinberger, 2015; Sipacio, 2015; Wang et al., 2013; Wu et al., 2013).

Other studies underlined that Facebook offers an alternative informal environment with flexible teaching and learning, and it increases students' interest and motivation (Dogoriti, Pange, & Anderson, 2014; Wichadee, 2013; Yen, Hou, & Chang, 2015). Compared with traditional LMS, Facebook appears to provide the opportunity to manage students' participation issues (Albayrak & Yildirim, 2015; Meishar-Tal, Kurtz, & Pieterse, 2012) and to reduce obstacles like a lack of familiarity with LMS (Harmon, Alpert, & Histen, 2014). Facebook also enlarges the context of learning enabling students to interact with anyone, including global peers and industry leaders, and at any time, as well as to receive feedback from a range of collaborators (Akbari, Pilot, & Simons, 2015; McCarthy, 2015a; Suthiwartnarueput & Wasanasomsithi, 2012; Wang & Vasquez, 2014; Yunus, Salehi, & Chenzi, 2012).

Some studies argued that Facebook use may serve the purpose of promoting and developing students' digital literacy skills (Prichard, 2013; Wang, 2014) or of experimenting with teaching approaches suitable to 21st century educational needs (Paliktzoglou & Suhonen, 2014). Studies carried out in the STEM (Science, Technology, Engineering and Maths) field indicated that Facebook may provide a suitable place for authentic problem solving (Gregory et al., 2014; Lin et al., 2014; Penman & Thalluri, 2014) and that it allows learners to experiment in a safe environment (Daclan, 2013).

As far as the results of studies are concerned, a number of papers reported a more positive impact on learning processes and participation when Facebook was compared with traditional LMS such as Moodle or Blackboard (Chang & Lee, 2013; Chen, 2015; Daclan, 2013; Gregory et al., 2014; Hurt et al., 2012; Kent, 2013; Kurtz, 2014; Lateh, 2014; Lin et al., 2013; Meishar-Tal et al., 2012; Miller, 2013; Parmaxi & Zaphiris, 2015; Pattanapichet & Wichadee, 2015; Sutcliffe & Alrayes, 2012; Tananuraksakul, 2014). In a qualitative study carried out in teacher education, Meishar-Tal et al. (2012) found that students perceived the Facebook group as a dynamic and collaborative learning environment that supported mutual help and social consolidation. The authors claimed that 'the Facebook group is not just an alternative to LMS but has some major advantages over traditional LMSs in promoting collaborative and active learning' (Meishar-Tal et al., p. 45). In the context of higher education, Chang and Lee (2013) compared students' performances related to business plans in Facebook and Moodle and found that students' learning effectiveness in the Facebook group exceeded that of students in the other groups. In the former group, it was found that partner trust (expertise, shared values and sharing of meaningful information) and cooperation increased significantly.

In a similar vein, several authors reported that the use of Facebook as an LMS had the potential to engage students even in out-of-class discussion with instructors and to increase student motivation, peer learning and feedback (Albayrak & Yildirim, 2015; Bariş & Tosun, 2013; Geyer, 2014; Karal et al., 2015; Miron & Ravid, 2015; Musa et al., 2015; O'Bannon, Beard, & Britt, 2013; O'Bannon, Britt, & Beard, 2014; Omar, Embi, & Yunus, 2012; Öztürk, 2015; Rachtam, Kaewkitipong, & Firpo, 2012; Rubrico & Hashim, 2014; Shih, 2013; Shraim, 2014; Souleles, 2012; Staines & Lauchs, 2013; Stankov, Glavinić, & Krpan, 2012; Varol, 2012; Vincent & Weber, 2014; Wang, Leng, & Lee, 2015).

Despite Facebook positively influencing learning, other studies reported factors that impacted negatively on students' engagement and participation. Students were mostly reluctant to use Facebook to deliver instructional material instead of an e-learning platform (Rožac, Ballester, & Buendía, 2012). Facebook use was also perceived as a workload that impacted heavily on students' daily routine (Meishar-Tal et al., 2012) or as a means that increased interaction but did not significantly affect learning achievements or high order cognitive processes (Acar, 2014; Hou et al., 2015). It was also found that Facebook helped reproduce power relationships because gifted students took benefit from peer exchange with lecturers, while disadvantaged students did not (Rambe, 2012a). For some authors, students should be trained to be able to protect their privacy and to engage in meaningful discussions (Harmon et al., 2014; Sidekli et al., 2013; Singh, 2013).

Some studies reported no statistically different results between students' academic performance when they used Facebook for instructional purposes (Arabacioglu & Akar-Vural, 2014; Kucuk & Sahin, 2013). Finally, some authors found that lack of time (Root Kustritz, 2013) or defective organization of course materials were barriers to students' Facebook use (Sapargaliyev, 2014).

Affordances of Facebook

More than one-third of the studies ($N = 26$; 37.7%) leveraged on the opportunity to mix instructional content with information and resources, generated in outside settings and disseminated through different platforms (Akbari et al., 2015; Albayrak & Yildirim, 2015; Alias et al., 2013; Dogoriti et al., 2014; Geyer, 2014; Hurt et al., 2012; Karal et al., 2015; Kent, 2013; Lin et al., 2013; Miller, 2013; Omar et al., 2012; Öztürk, 2015; Parmaxi & Zaphiris, 2015; Penman & Thalluri, 2014; Prichard, 2013; Rachtam et al., 2012; Rambe, 2012a, 2012b, 2012c; Shraim, 2014; Singh, 2013; Wang et al., 2015; Wang et al., 2013; Wang & Vasquez, 2014; Yen et al., 2015; Yunus et al., 2012).

Fifteen studies (21.7%) emphasized the relevance of widening the context of learning combining formal educational situations with more personal settings (Chang & Lee, 2013; Hurt et al., 2012; Lin et al., 2013; Omar et al., 2012; Öztürk, 2015; Parmaxi & Zaphiris, 2015; Penman & Thalluri, 2014; Prichard, 2013; Rachtam et al., 2012; Rambe, 2012a, 2012b, 2012c; Singh, 2013; Wang et al., 2015; Wang & Vasquez, 2014).

Only six studies (8.7%) took advantage of the expertise of external contributors including peers, such as students of a higher level of knowledge and skills in a domain, and professionals (Geyer, 2014; Penman & Thalluri, 2014; Rambe, 2012a, 2012b, 2012c; Karal et al., 2015).

Cultural issues

Overall attention to the cultural dimensions of Facebook use was rather limited. Acar (2013) argued that harmony is an important value for students of East Asian countries like Japan. This implies, for instance, that optional Facebook use would cause uncertainty in students who prefer conformity with their peers. The author also highlighted that Japanese students are becoming increasingly prone to use their real names and pictures in social media sites and that they are also ready to use these sites in the classroom.

Paliktzoglou and Suhonen (2014) reported the relevance of cultural difference in the acceptance of Facebook. They pointed out students' sceptical attitude towards the use of Facebook as a teaching tool when it was used to add 'coolness' to the course. Prichard (2013) emphasized that language learners may face further challenges when they use a social networking site with target language users. While they are required to compare a foreign language and culture, at the same time they are supposed to deal with different use of social networking sites by their peers.

Finally, Tananuraksakul (2014) reported that power relations between students and instructors are culture-embedded. Students who clicked 'Like' because they wanted their instructor to be aware of their participation might have been induced to do so to manifest their politeness and respect for the teacher's power.

Conclusions on formal use of Facebook in formal learning settings

The studies classified in this typology benefited from Facebook potentials to support formal learning in formal settings to different degrees (Greenhow & Lewin, 2016). Despite differences in terms of purposes, processes of

learning, locations/contexts and content, the studies presented common characteristics. First, several papers aimed at evaluating teaching and learning effectiveness of Facebook when compared with traditional LMS or used as a CMS. In many cases, Facebook proved to be an effective learning tool in supporting discussion, interaction, communication and collaboration between teachers and students, and among students.

Second, although all the experiences were teacher-initiated, some were not teacher-led. Most studies that were carried out with the principles of socio-constructivism or connectivism emphasized the pedagogical relevance of collaborative work, peer learning and peer assessment. From this perspective, activities were often student-led. However, teacher facilitation and coaching were claimed to increase the quality of the learning and cognitive processes.

As far as the location/context is concerned, although the setting was school classrooms or lecture halls, Facebook potential to widen the traditional boundaries of formal settings was reported as an added value for the learning experience.

Lastly, instructional materials were only partially predefined. When socio-constructivist or connectivist pedagogies were implemented, Facebook was used as a proper site for knowledge construction through social interaction.

Informal use of Facebook in formal settings of learning

Related literature

Social media and social network sites have been investigated as spaces for learning with varying degrees of formality and informality. Specific focus of informal use has been emphasized by several authors, who aim at pointing out the benefits, as well as the critical issues that emerge when teachers try to include digital tools that were specifically designed for informal activities in formal settings (Dabbagh & Kitsantas, 2012; Greenhow et al., 2014; Greenhow & Lewin, 2016). According to Dabbagh and Kitsantas (2012), social media and social network sites have pedagogical affordances that can support and foster student self-regulated learning through the creation of personal learning environments in a synergistic and interdependent way. In their pedagogical framework articulated in three levels (personal information management, social interaction and collaboration, and information aggregation and management), the authors argue that social network site use might be encouraged to support the forethought phase of self-regulated learning processes such as goal setting and planning and to create personal or private learning space by self-generating content. Moreover, these sites might be used to engage students in basic sharing and collaborative activities. Students, for instance, may extend their personal learning environment from a personal learning space to a social learning one, thus supporting self-regulation processes of self-monitoring and help seeking.

According to Greenhow and Lewin (2016), in the social media landscape learners are increasingly bridging informal practices into formal educational contexts. The consequences might be the adoption of many of the features provided by informal learning enhanced by technology capabilities and affordances, such as network support, online and ubiquitous, individual and social recognition, and knowledge as collective agreement. Because of young people's growing engagement with digital cultures, some educational policies are increasingly adopting informal learning practices.

These ideas are specifically reinforced when children and youths' attitude to learning, whether formal or informal, is investigated. Greenhow et al. (2014), who emphasize the relationship between in-school and out-of-school practices, report how children and youths demand learning spaces that should be as similar as possible to the social network spaces they are familiar with. The latter are fun and participatory and invite connection and communication between peers. At the same time, when the traditional spaces of out-of and in-school are blurred, new digital literacies and competencies are requested. In another study, Greenhow (2011) points out how social network sites might be re-envisioned as support for student learning outcomes at least from two perspectives. First, they can provide peer/alumni support to manage the ups and downs of high school or college life or help with school-related tasks; second, social network sites can stimulate online and offline social and civic benefits.

However, some studies have questioned the enthusiasm in the participatory power of the social media. For instance, Hargittai and Walejko (2008), in a study on participatory and creative uses of digital technologies,

claim that, despite the new opportunities for production and sharing offered by Web 2.0 tools, there are few people who actually produce and distribute content. The main trend is to consume information rather than produce it. This trend demonstrates that, although young people have high familiarity with information and communication technologies, they have low levels of cognitive, social and ethical skills.

Reasons for use and results of the studies

With a specific focus on the pedagogical reasons that motivated the choice of Facebook as an informal tool in a formal learning setting, a number of arguments were reported. One of the most frequent was the possibility of providing subject matter content in an informal way (Basitere & Ivala, 2015; Birkeland, Danbolt Drange, & Tønnessen, 2015; Daher, 2012; da Silva de Vargas et al., 2014; Gray & Howard, 2014; Ho, 2013; Jaffar, 2014; Krom, 2012; Lantz-Andersson, Vigmo, & Bowen, 2013; Magogwe, Ntereke, & Phetlhe, 2015; Pektas & Gürel, 2014; Razak, Saeed, & Ahmad, 2013; Reinhardt & Ryu, 2013; Tsovaltzi et al., 2014; Tsovaltzi et al., 2015; Yuksel, 2013). Another one was to enhance transversal skills (Asterhan & Hever, 2015; Sun & Yang, 2015).

The purpose to informally involve as many students as possible was specifically claimed in large classes or in MOOCs, where cultivating a sense of community was also an objective (Bowman & Akcaoglu, 2014; Dougherty & Andercheck, 2014; Dyson et al., 2015; Harvey et al., 2014).

Other authors pointed out the opportunity to provide a space for practice and communication that was free of the traditional pedagogic concerns of a typical classroom (Ekoç, 2014; Lieberman, 2014). Others reported the development of skills related to the democratic participation of everyone in the classroom (Alexander & Sapra, 2014), the promotion of peer teaching and peer assessment (Ravindran et al., 2014), or the enhancement of social presence in the classroom community (Gordon, 2014; Razak & Saeed, 2014). Several studies emphasized the opportunity to foster independent extracurricular student engagement (Clements, 2015) or to increase students' motivation and engagement even outside the classroom (Ivala & Gachago, 2012; Lai et al., 2014; Nkhoma et al., 2015).

With specific reference to teacher education, several authors pointed out the importance of familiarizing pre-service teachers with social networking sites, so they could use these sites as teachers and educational agents in the future (Daher, 2012, 2014; Demiraslan Çevik, Çelik, & Haşlaman, 2014; Deng & Tavares, 2015; Kim, 2015).

Facebook exploitation to facilitate collaborative learning that enlarges the traditional space of teaching and learning was emphasized as an ideal space where users can engage intellectually and form networked learning communities (Huang et al., 2014; Irwin et al., 2012). Informal use would also encourage membership of professional organizations and groups (Kostka-Rokosz, Dvorkin Camiel, & McCloskey, 2014).

Finally, several studies pointed out Facebook choice because of the uniform strength of its features as compared with other popular social networking sites or LMS (Hall & Maughan, 2015; McCarthy, 2012, 2013; Walton & Rusznyak, 2014; Whittaker, Howarth, & Lymn, 2014).

As far as the results of the studies are concerned, among the benefits of using Facebook in an informal way, one of the most frequently mentioned was the connection of course materials to timely real-world examples that enhance students' theoretical and conceptual understanding of material (Alexander & Sapra, 2014; Lai et al., 2015; Weber & Vincent, 2014). This connection especially applied to the study of foreign languages, where students felt more comfortable in writing and participating in online discussions. Burdens of grammar, spelling and vocabulary would be eased, as students felt they were not judged and could learn from their mistakes (Vikneswaran & Krish, 2015).

Another benefit was the increase of student engagement and motivation (Clements, 2015; Ivala & Gachago, 2012; Lam, 2012; Sincar, 2012), and it was stressed in numerous student-led and student-initiated learning activities. At times the latter lasted after the course was finished (Esteves, 2012; Kinchin & Bryant, 2015).

In some experiences carried out in secondary and higher education settings, the authors measured a significant improvement in group learning as well as for exchanging information on group projects (Aaen, 2015; Kio, 2015; Safuan & Soh, 2013; Tower, Latimer, & Hewitt, 2014). Students were also able to establish affective communication and social support within the group (Whittaker et al., 2014). Others emphasized that

Facebook use allowed students to acquire and/or develop instrumental, interpersonal and systemic competences (Román & Martín, 2014).

In cross-country projects that involved different cohorts of students, the results showed the possibility for boundary crossing. Facebook allowed generation of extended spaces for collaborative learning activities and mentoring schemes where students combined their school subjects and their everyday lives (Lantz-Andersson, 2015; Lantz-Andersson et al., 2013; McCarthy, 2012, 2013; Rashid & Rahman, 2014).

However, some authors reported contradictory results for learning achievement. They cautioned that, although it is important to provide interventions that offer guidance, it was also imperative to respect the structure of Facebook discussions, such as the asynchronous collaborative mode of communication (Tsovaltzi et al., 2015). Others complained that students' communication was largely assessment-driven (VanDoorn & Eklund, 2013), or much too focused on teacher's requests (Ekarattanawong et al., 2015; Ho, 2013).

Finally, for some authors, Facebook was a better option when students were required to carry out the activity on Facebook or in an LMS (Birkeland et al., 2015; Veira, Leacock, & Warrican, 2014), or complemented other LMSs as a cheaper and more accessible option in disadvantaged countries (Magogwe et al., 2015). Another benefit was directly related to increasing familiarity with several devices or to evaluating mobile-based learning environments (Brewer et al., 2015; Ioannou et al., 2015). However, other studies emphasized factors that could potentially impede learning from social networking sites on a mobile device, such as the reluctance to disclose information about oneself to the network, the diverging notions of online and offline friendships, and the lack of stimulation to connect with others (Gabarre et al., 2013).

Affordances of Facebook

With reference to Facebook affordances, more than half of the studies ($N = 36$, 52.9%) exploited the combination of instructional material with information and knowledge sources produced elsewhere and available through several channels (Alexander & Sapra, 2014; Arouri, 2015; Asterhan & Hever, 2015; Barden, 2014; Baya'a & Daher, 2012; Birkeland et al., 2015; Brewer et al., 2015; Clements, 2015; da Silva de Vargas et al., 2014; Daher, 2012, 2014; Deng & Tavares, 2015; Dougherty & Andercheck, 2014; Dyson et al., 2015; Ekoç, 2014; Esteves, 2012; Gabarre et al., 2013; Gray & Howard, 2014; Hall & Maughan, 2015; Harvey et al., 2014; Ho, 2013; Jaffar, 2014; Kim, 2015; Kinchin & Bryant, 2015; Kostka-Rokosz et al., 2014; Krom, 2012; Lantz-Andersson et al., 2013; Lieberman, 2014; Magogwe et al., 2015; McCarthy, 2012, 2013; Rashid & Rahman, 2014; Razak et al., 2013; Román & Martín, 2014; Sincar, 2012; Whittaker et al., 2014).

Twenty-four (35.3%) studies exploited the possibility of mixing the context of learning with issues relating to social and personal lives, by means of personal reflections provided by students' real-life and personal experiences (Barden, 2014; Baya'a & Daher, 2012; Birkeland et al., 2015; Brewer et al., 2015; Daher, 2012, 2014; Deng & Tavares, 2015; Dougherty & Andercheck, 2014; Dyson et al., 2015; Ekoç, 2014; Gray & Howard, 2014; Hall & Maughan, 2015; Kim, 2015; Kostka-Rokosz et al., 2014; Krom, 2012; Lantz-Andersson, 2015; Lantz-Andersson et al., 2013; Lieberman, 2014; McCarthy, 2013; Rashid & Rahman, 2014; Razak et al., 2013; Román & Martín, 2014; Sincar, 2012; Whittaker et al., 2014).

Finally, only 13 (19.1%) studies drew on the contribution of out-of-the-classroom learners (Arouri, 2015; Baya'a & Daher, 2012; Ekarattanawong et al., 2015; Hall & Maughan, 2015), during cross-country projects (McCarthy, 2012) or the involvement of practicing professionals and external experts (Brewer et al., 2015; Demiraslan Çevik et al., 2014; Gray & Howard, 2014; Harvey et al., 2014; Ho, 2013; Kostka-Rokosz et al., 2014; Rashid & Rahman, 2014; Román & Martín, 2014).

Cultural issues

Only a few studies reported cultural issues. Ekoç (2014) pointed out how the expectations of linguistic behaviour and of established power relations between students and teacher did not align with some students' established understanding of teacher/learner relations. Magogwe et al. (2015), who investigated reasons for lack or poor participation among their students, reported religious beliefs as one of the reasons that made participation in the Facebook activity uncomfortable. During an experience working with ethnic mathematicians, Daher (2012) pointed out how the participants were made proud

of their ethnic and religious heritage that resulted in an increase of their self-esteem.

Another cultural issue was related to the difference between individual-based and collective-based societies. Leung et al. (2015) pointed out how Asian students usually consider authors and lecturers as the final authorities who are always right. Students who ask questions and share knowledge in classes may be considered as displaying rude and disrespectful behaviour. However, in this study the majority of the students asked questions via electronic and telecommunication channels and appreciated Facebook for knowledge sharing and discussion.

Conclusions on informal use of Facebook in formal learning settings

Studies classified in this category exploited Facebook potentials to support informal learning in formal settings to different degrees (Greenhow & Lewin, 2016). They globally reported a complex framework of purposes, processes of learning, locations/contexts and content. In most experiences, learning subject matters or transversal skills was the purpose of the activities. However, unintended outcomes or casual learning results were also reported. While the audiences were mostly intended for school or university participants, external audiences such as external schools and universities or professionals were also involved.

Moreover, while some studies mostly relied on student-led activities, though teacher-initiated, others resulted in self-directed learning or extended by students beyond the course. The studies that mainly relied on the acquisition of social competences or affective learning were mostly based on peer-to-peer teaching or assessment, and feedback was also provided by peers.

With reference to the location/context, although the setting was predominantly the school classroom or the lecture hall, extended boundaries were promoted in those studies that relied on international or cross-country learning experiences. In these cases, time-restricted tasks were made open to accommodate larger timespans.

Finally, with reference to content, learning design was not always addressed by curriculum. Open learning practices were encouraged in those studies that exploited Facebook affordances, especially hybridization of expertise and widening of context of learning, and external audiences and different expertise were involved.

Use of Facebook in informal settings of learning

Related literature

The novelty that new technologies introduce in informal learning has been recognized as mainly related to a pedagogy of participation. Pedagogies of participation also foster distributed and locally based forms of evaluation and assessment (Downes, 2010). The role of social media and social networking sites in youths' informal learning settings has been thoroughly investigated (Erjavec, 2013; Greenhow & Robelia, 2009; Ranieri & Bruni, 2013; Russo, Watkins, & Groundwater-Smith, 2009). According to these studies, social network sites can enhance informal learning in contexts such as museums, libraries and galleries. The latter offers young people agency previously unavailable to become active participants in cultural production (Russo et al., 2009). Erjavec (2013) explored how primary school pupils use Facebook for informal learning primarily as social support. Through an extensive network of ties, relying on bridging and bonding social capital, pupils exchange practical information, learn about technology, evaluate their own and other people's work, gain emotional support, organize group work and communicate with teachers. In another study, Greenhow and Robelia (2009) report how social network sites may provide promising contexts for learning to supplement school-based experiences. Social network sites used outside of school allowed students to formulate and explore various dimensions of their identity and demonstrate 21st century skills. Ranieri and Bruni (2013) also explored the potential of social mobile media for self-expression and participation of young people at risk in an after-school programme. Facebook was used as a collective profile to share and tell stories that helped teens to explore their own identities and stimulated their participation.

Social networking has also progressively gained attention in professional development for in-service teachers and professionals (Bodell & Hook, 2011; Ranieri, Manca, & Fini, 2012; Rutherford, 2010; Steinbrecher & Hart, 2012; Zhao & Kemp, 2012). Social networking services have also gained momentum in research as a means through which to support informal learning at work (Zhao & Kemp, 2012). For instance, Bodell and Hook (2011) report how the use of Facebook groups for occupational therapists provided secured benefits in terms of personal and professional support

and guidance. Therapists achieved work-related outcomes that could not have occurred through traditional networking. Rutherford (2010) was one of the first scholars to investigate the potentials of Facebook groups for teachers' professional development. The study highlights how the participants controlled the learning process addressing their own discussions that impacted on their teaching practices. In a similar vein, Ranieri et al. (2012) investigated how Facebook groups served the purpose of sharing resources and practices on school-related issues for teachers. The authors report different types of group membership and different participatory dynamics. The analysis was carried out on the basis of group types (generic vs. thematic), duration of membership and interplay between offline and online activities. The results show that generic groups are mainly characterized by bridging social capital, while thematic groups are mostly portrayed by bonding social capital. Also Steinbrecher and Hart (2012) found that Facebook was able to provide support for the exchange of professional practices among teachers and educators. Although not organized explicitly in professional groups, it was found that pre-service teachers were able to carry out professional and task-oriented interactions on their profiles, to share resources and provide support and mentorship.

Reasons for use and results of the studies

The majority of the studies were carried out in out-of-school settings. Pedagogical reasons for the studies ranged from engaging young people (ages 16–25) in debating socio-scientific issues (Greenhow, Gibbins, & Menzer, 2015), to promoting positive behaviour towards climate change (Senbel, Ngo, & Blair, 2014), to fostering knowledge construction among young participants (Idris & Ghani, 2012) and to investigating facilitation styles in museum environments (Sackey, Nguyen, & Gabrill, 2015).

The results pointed out that social media environments like the Hot Dish application can provide opportunities for young people to engage in debates about socio-scientific issues and to develop learners' contemporary scientific literacy (Greenhow et al., 2015). In an out-of-academy context, Facebook served as a peer-mentoring structure that solved the problem of role conflict in an intercultural experience that involved students on a year abroad (Lang, 2012). Moreover, Facebook proved to be a useful and effective resource for students' group communities in several countries in assisting the users in searching for, analysing and accessing information in self-initiated activities (Riady, 2014).

In professional development studies that involved cohorts of in-service teachers or professionals, the purposes were to support teachers' professional learning in communities of practice (Goodyear, Casey, & Kirk, 2014; Palmquist & Barnes, 2015) or to accommodate informal learning styles among medical laboratory scientists (Cassaniti, Mwaikambo, & Shore, 2014).

Facebook represented an innovative approach for professional learning that supported pedagogical change and overcame financial and time constraints for facilitators and teachers working together (Goodyear et al., 2014). It also provided a means by which teachers could form a network for informal learning and communicate easily with peers across the world (Palmquist & Barnes, 2015). A Facebook page served the objective of providing informal service to medical students in resource-limited environments (Pimmer, Linxen, & Gröhbiel, 2012). In this study, participation in virtual professional communities across national boundaries allowed negotiation of professional status and identities.

Affordances of Facebook

With reference to Facebook affordances, most of the studies ($N = 8$, 80.0%) exploited the possibility related to differently combining information and knowledge sources produced and available through several channels (Cassaniti et al., 2014; Goodyear et al., 2014; Greenhow et al., 2015; Idris & Ghani, 2012; Palmquist & Barnes, 2015; Pimmer et al., 2012; Riady, 2014; Sackey et al., 2015).

Seven (70.0%) studies exploited the possibility of hosting different levels of expertise and participation (Cassaniti et al., 2014; Greenhow et al., 2015; Idris & Ghani, 2012; Palmquist & Barnes, 2015; Pimmer et al., 2012; Riady, 2014; Sackey et al., 2015).

Finally, all of the studies (100.0%) mixed and hybridized the different contexts of learning with no clear-cut boundaries between contexts (Cassaniti et al., 2014; Goodyear et al., 2014; Greenhow et al., 2015; Idris & Ghani, 2012; Lang, 2012; Palmquist & Barnes, 2015; Pimmer et al., 2012; Riady, 2014; Sackey et al., 2015; Senbel et al., 2014).

Cultural issues

No specific cultural issue was reported in the studies.

Conclusions on use of Facebook in informal learning settings

The studies related to the typology of informal learning, either out-of-school or professional development, exploited the categories related to informal learning to different degrees (Greenhow & Lewin, 2016). They implemented purposes, processes of learning, locations/contexts and content as they are usually ascribed to informal learning settings. The purposes of learning were self-determined or not recognized as an intended outcome. Audiences were mostly widespread and involved participants from different countries, with evidence of patterns of legitimate peripheral participation (Lave & Wenger, 1991).

Learning experiences were mostly open ended with no time restrictions, such as professional communities of practice and located among several learning settings (museums, out-of-school facilities, etc.). No assessment procedure was adopted, and no certification was provided for accomplishment of learning tasks. The informal dimension of learning relied on serendipitous acquisition of knowledge and flexible outcomes that were sustained through network support and social recognition.

Discussion

This review extends and updates the results of a preliminary exploration carried out by Manca and Ranieri (2013). The high number of studies that were identified in the search and selected for the review is an indicator of the ever growing interest in the use of Facebook as a technology-enhanced learning environment. In line with the findings of the original review (Manca & Ranieri, 2013), the majority of the studies reported learning experiences that occurred in formal learning settings, mostly in higher education. This is not surprising, in so far as higher education scholars are used to documenting and disseminating learning experiences more than teachers and practitioners in fields like school or out-of-school.

Although the interest and the focus mostly rely on formal settings, unlike Manca and Ranieri's study (2013), this review reports a significant number of informal learning experiences. Facebook is still mostly considered as an open alternative to traditional LMS, although learning design solutions managed differently academic tasks such as posting assignments, content delivery and feedback provision. Despite learning design differences, the majority of the studies assessed the group as the most reliable Facebook feature to carry our learning activities, as also found in Manca and Ranieri's study (2013). However, a number of studies reported learning experiences aimed at promoting social interaction, collaboration and peer learning according to the principles of socio-constructivist and connectivist frameworks (Dron & Anderson, 2014; Siemens & Weller, 2011), and tried to overcome LMS limitations reported in the literature (Jong et al., 2014; Conde et al., 2014).

The number of studies that explicitly stated pedagogical reasons to use Facebook as a learning tool is another difference with the original study (Manca & Ranieri, 2013). In the latter study the prevailing reasons for Facebook use was popularity and familiarity among young people, and teachers addressed youths' requests for familiar sites in formal learning. Almost half of the studies in this review reported pedagogical reasons and aimed at evaluating Facebook efficacy as an instructional tool in formal use in formal settings, or at exploring the use of Facebook as a supportive and interactive tool for learning in informal uses.

Moreover, although the investigation of students' reactions to Facebook as an instructional tool was the main reason for a small number of studies, authors seem globally moving from a first stage of familiarization with social network sites to more mature stances from which to thoroughly investigate the pedagogical value of these sites. For instance, the need to provide guidance or the complaints about Facebook's lack of features that support the development of cognitive skills has been pointed out in several studies, in line with what is stressed by scholars (Kirschner, 2015). However, different degrees of teacher guidance and forms of assessment are claimed according to degrees of formality and informality.

The interest in the pedagogical dimension is also supported by a number of studies that assessed Facebook as an environment that facilitates the interplay between formal education and real life. Facebook bridges personal experiences and institutional knowledge and enables the connection of course materials to timely real-world examples, also by supporting self-directed learning. From this perspective, the results

are consistent with the literature in the field (Dabbagh & Kitsantas, 2012; Greenhow et al., 2014; Greenhow & Lewin, 2016).

Exploitation of Facebook affordances was another consequence of pedagogical choices. Mixing information and learning resources, hybridization of expertise and widening context of learning were found to be significantly increasing along the continuum formality/informality. In informal situations, the possibility of mixing academic and social contexts or of involving external learners and professionals was exploited to overcome the closed boundaries of classrooms and lecture halls. The blurring of the boundaries was also supported by the related choice of Facebook 'open' features such as pages or applications and stressed the learning situation moving towards openness and informality. However, although different types of educational use of Facebook exploited these affordances to different degrees, in contrast with the 2013 review (Manca & Ranieri, 2013), Facebook pedagogical affordances are still partially implemented.

The different nature of the pedagogical dimensions investigated does not allow us to compare results between studies effectively. Most of the studies do not offer evidence of actual meaningful improvements in learning outcomes or in the classroom or lecture hall learning environment. Despite the claims made in the studies, the nature of assessment items that were used does not always align with the pedagogical dimensions that were explored. The main concern seems to be a balance between students' satisfaction and evaluation of learning results. Some caution is still reported on students' acceptance and effective pedagogical exploitation. However, global attitudes seem to be more favourable from both sides (teachers and students) than in the first review (Manca & Ranieri, 2013).

In the following section research gaps that have been identified in this section are reported in detail along with further directions for future research.

Research gaps and directions for future research

Despite an increasing number of empirical studies mostly in the first two strands of research (formal use and informal use in formal settings), this review identifies important research gaps. To further advance the research field, we have identified a number of research areas that need attention in future studies on formal and informal use of Facebook for learning.

The first research gap is related to the lack of clarity on how the studies measured learning outcomes and whether the latter support learning objectives optimally as stated in the authors' intentions. Many of the studies lack evidence of effective learning achievements, and they preferably measured students' perceptions and responses to the learning experience. We suggest that future studies should use improved measurements of learning outcomes that are also theoretically and methodologically based (see Reeves, Herrington, & Oliver, 2004).

Moreover, many of the studies relied on a generic socio-constructivist theory. Few studies were conducted using a clear theoretical framework or specific hypothesis to test. A clear theoretical framework, along with specific hypotheses to test through suitable methodological approaches, can explain if and why Facebook is an effective tool especially for formal learning (see Kirschner, 2015).

Furthermore, the studies conducted in secondary education and informal learning settings did not provide a thorough framework of the copious learning experiences carried out in those contexts. The propensity of academia to document mostly case studies carried out in higher education runs the risk of overshadowing the conspicuous number of cases that occur in after-school clubs or civic associations. An increase of documented research in these settings could contribute to clarifying the relationship between the formal and the informal dimensions of learning supported by social network sites, as well as to pointing out the blurring of boundaries between the two (Greenhow & Lewin, 2016).

Another aspect that future studies need to take into account is how cultural differences between countries affect the propensity to adopt Facebook for learning and the ways students react to their use in education according to several cultural variables. Only a few studies reported how cultural variables influence students' learning: power relations between students and their teacher; religious beliefs and topics related to ethnicity; individual-based and collective-based cultures. Cultural issues deeply influence how students perceive and manage their participation in Facebook-led learning experiences. With reference to the distinction between individualistic and collectivistic cultures, for instance, some authors investigated how Facebook users in

individualistic cultures (e.g., Americans) have more ego-centric networks than users in collectivistic cultures (e.g., East Asians) and tend to have more tight-knit networks (Na, Kosinski, & Stillwell, 2015). Other studies have underlined how religion, ethnicity, language and gender are significant factors that influence the adoption–perception–use behaviour of Facebook (Liew, Vaithilingam, & Nair, 2014). However, while in social science studies, factors related to the influence of religious or ethnic identity in affecting social media adoption have been gaining growing consideration (Herbert, Greenhill, & Gillespie, 2012), there is little about how they influence participants' behaviours in learning situations. Adopting learning design approaches that also deal with these cultural variables can provide hints on what happens when a new digital tool is introduced to different cultures and whether the tool can potentially bridge those cultures (Na et al., 2015). In addition, design approaches can also contribute to point out whether Facebook, with its specific characteristics that inform the way the connectivity is built and operated by the technical capabilities and by the users' preferences (van Dijck, 2013), has been globally 'exporting' the same implicit 'pedagogical' model throughout the world (Friesen & Lowe, 2012).

Limitations of the study

The review was performed on a number of databases and within a number of educational-related journals. However, it was necessarily narrow in scope as it examined only papers published in English language journals. This means that much of the published literature that involves substantial cohorts of scholars who preferably publish in other languages (mainly in French and Spanish-speaking countries) were necessarily neglected. Facebook has reached high rates of diffusion all over the world, with the main notable exception of China where it is banned. It is conceivable that its use in formal and informal learning contexts might be widespread also in those countries, with reports of usage in other languages than English. In our review, this is pointed out by a majority of studies documented in English-speaking countries or where English is the main language for scholarly communication. Thus, reviews that aim at providing extensive coverage of Facebook use in a number of geographical areas should canvass further databases and journals beyond English-based sources.

Moreover, although the review examined almost 150 papers, we opted for a qualitative review rather than for a quantitative meta-analysis. Although the latter would be an optimal integrative method to take stock of this trend of research, the available studies in each of the three domains (formal use in informal learning settings, informal use in formal learning settings and use in informal learning settings) are too heterogeneous to justify a quantitative meta-analysis.

Conclusion

Social media and social network sites like Facebook in education are no longer a new phenomenon. An increasing number of studies have been published in recent years to explore the pedagogical potential of Facebook and its effectiveness as an instructional/learning tool. The studies included in our review indicate that Facebook is an informal, dynamic, social and flexible environment where more or less structured learning experiences can take place. However, some affordances still seem to be underexploited, particularly referring to mixing information and learning resources, hybridization of expertise and widening context of learning. Although there is a tendency to take advantage of these opportunities, the attitude to see Facebook as a closed space to deliver teaching and support learning still resists.

We think that a better understanding of hybrid situations through improved methodological tools may help educational institutions to face the challenge of bridging formal and informal dimensions of learning and benefit from the convergence of space of learning and space of life. Exploitation of the familiarity with and popularity of social media sites among young people cannot be justified to reshape current pedagogical and teaching practices. However, popularity evokes the idea of pleasantness and may have an impact on motivation and engagement. Familiarity entails that learners already know how to use these tools, and they need less support to become autonomous and self-directed. Both concepts are pedagogically relevant to foster students' engagement and autonomous development (see Dewey, 1916). At the same time, we cannot underestimate the fact that social network sites have their own 'grammars' that (young) people have to learn for a proper and aware use. Either formal or informal, the use of Facebook requires digital and media literacy skills (Hobbs, 2010)

in order to face the cognitive (e.g., information overload and reliability) and ethical challenges (e.g., privacy) that are implied in these sites.

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