Social media and higher education apps in higher education: a literature review

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Abstract

Mobile learning is growing in popularity due to its nature and the access to mobile devices: students of different ages can use their mobile phones to access any information almost anywhere. The popularity of mobile devices and the current growth of social media allow to apply mobile social media learning in higher education. This systematic review gives an overview of the current usage of mobile social media learning, the use cases, barriers, advantages and difference between personal social media and higher education apps within a learning context. The main findings of this paper indicate that social media is a good tool for collaborative purposes, communication purposes, resource sharing and accessing. However, social media use cases are limited at the current state, as higher education apps provide more specific and learn-based functionalities. Furthermore, using social media in a formal way helps to make the education process more personal by having a direct connection with instructors. However, there are still barriers that institutions have to overcome, which include the social media integration models into higher education. This paper, therefore, also discusses the existing integration frameworks and proposes an extension of its current model.

1 Introduction

Mobile learning is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Crompton & Burke, 2018). The number of mobile devices is growing and surpasses 6 billion ("Smartphone users 2020", 2021), with an increase of 3 billion since 2016. With the ability to access information anytime, mobile learning becomes a more common practice in higher educations. The use of mobile learning within the higher education context shows an increase in academic performance, with an increase in highest marks, average marks and passing rate (Ng et al., 2016).

Higher education (HE) apps are applications developed for the purpose of academic studying, which is more focused on formal learning. HE apps include any applications that instructors use for teaching. Examples of HE applications include Kahoot! - an application for game-based learning (Martín-Sómer et al., 2021), HEgameApp - a gamification application (Aguiar-Castillo et al., 2020) and iLearning - an application developed for nursing students (Ho et al., 2021). For the purpose of this paper, mobile higher educational applications include learning management systems (LMS). A *learning management system* is an application for different educational activities. They activities

1

include administration, tracking, and course content delivery (Wikipedia contributors, 2021). LMS provides students with all learning content. An example of a learning management system with a respective mobile application is Moodle and Curatr: they help teachers to promote more engaging courses (El-Sofany & El-Haggar, 2020).

As mentioned previously, HE apps are focused on formal learning. Formal learning refers to a way of learning where learners are engaged with teacher-developed materials and are used during an institution programme in a structured and strict manner (Gikas & Grant, 2013). On the other hand, informal learning can be defined as learning in an informal context (for instance with friends, outside of the class hall). Therefore, it is essential to understand the connection between personal social media apps and HE apps, as there is a possible difference in the learning context.

The influence of social media on the lives of students has been increasing in the past years. For example, some sources indicate that the time spent on Facebook negatively affected school/college grades (Greenhow & Lewin, 2016). It has also been found that students prefer social media for course-related communication or use it for socialisation and non-academic purposes. This makes it important to understand the role of social media in higher educations and if it can be used for educational purposes.

Social media (SM) applications can be defined as "a group of Internet-based applications that build on the ideological foundations of Web 2.0, and that allow the creation and exchange of user-generated content" (Gikas & Grant, 2013). As summarised in the previous works, "using social media tools in learning promotes a more student-centred course" (Gikas & Grant, 2013). This statement is clear because naturally, as technologies evolve, people of different ages get more involved in technologies and online activities, including social media usage. According to the statistics (Georgiev, 2021), 16-24-year-olds spend an average of 3 hours a day on social media. This statistics is expected, as social media allows for social interactions between teenagers on distance.

Several studies indicate that students do not perceive different social media as a learning tool. As indicated in the study, "most of the students do not perceive that Facebook is useful for learning and thus they do not have any intention to use Facebook for learning" (Moorthy et al., 2019). The fact that students are not willing to use Facebook for educational purposes might indicate that Facebook lacks some features that may have influenced students to use social media for learning purposes. On the other hand, WhatsApp is used by students to share learning material, such as lectures, lecture notes, websites, assignments and others (Dr, 2021). Therefore, if implemented correctly, students can benefit from using social media for learning purposes. The findings also need to be reconsidered with the growth of other previously unpopular social media networks available on mobile devices, such as Discord. Compared to 2019, Discord showed a growth of 84 million monthly active users (Curry, 2021).

Given the situation with COVID-19, many institutions have adapted to use distance education as a prevention measure, and it is crucial for students to feel comfortable studying online. Given the time spent using social media per day and in the context of distance learning, higher educations need to understand the differences between social media and HE applications and effective ways of integrating social media into the higher education context. The literature review aims to understand the use cases of personal social media applications and the connection between social media and higher education apps. Additionally, this research gives an overview of existing integration frameworks and proposes an extension to them.

1.1 Research Question

The main research question is:

"What is the connection between personal social media apps and educational apps: are there use cases for using classical social media apps for learning or more separation between social media and HE learning apps?".

This research investigates the use cases of mobile social media learning and the differences between SM apps and HE apps in the learning context. Based on the evidence found in the literature, this paper will propose an extension to existing models of integrating social media into HE applications (or HE features into social media), or, if none found, will conceptualise a new model based on the results.

In order to tackle the research question in a structured manner, it can be divided into the following sub-questions:

- What are the use cases of social media apps and higher education apps within the context of higher education?

- What are the potentials and challenges of integrating social media into a higher education environment?

The structure of the sub-questions will allow us to approach the main research question systematically. The first question aims to understand the use cases of social media compared to the use cases of HE applications. The results will give an insight into the current use of SM and HE apps, which will serve as a base to answer the second research question. The second question further looks into integrating social media into higher education settings, potentials, barriers, and existing integration frameworks.

2 Methodology

In order to answer the research question and the sub-questions, a systematic literature review will be conducted. A systematic literature review aims at the systematic "search for, appraise, and synthesis research evidence" (Grant & Booth, 2009). The review is expected to give results that present the current literature work that represents the topic under discussion in a systematic manner.

2.1 Search strategy

Making use of PRISMA principles (Liberati et al., 2009), the research starts with the selection of three databases of scientific works that will be used for this research, specifically: Scopus, IEEE Xplore Digital Library, ScienceDirect. The selection of databases ensures that scientific publications are peer-reviewed.

The following search terms and their combinations will be used in order to find scientific works related to the research question: "higher education", "learning management system", "mobile social media learning", "acceptance", "higher education applications", "integration".

2.2 Inclusion and Exclusion Criteria

The list of inclusion and exclusion criteria for secondary research can be found in Table 1.

Inclusion criteria	Exclusion criteria
Work must be published after 2018	The mobile device discussed in the study must not be a laptop, Netbook or stationary gaming console
Students involved in the research must study in a higher education program	
Students use mobile devices for learning within their HE	

Table 1: Inclusion and Exclusion criteria for literature review.

The year range (2018 - 2021) is enforced to ensure the relevance of the scientific work to the highly technologically changing environment. The "highly technologically-changing environment" includes new social media that are becoming popular (for example, Discord mentioned previously). Mobile learning is a growing field of study, and it is restricted to mobile network technologies. As such, 4G network availability and speed have increased drastically. For example, the availability of 4g in Italy in 2016 was equal to 54.16%, while in 2018, the number is increased to 69.66% ("The State of LTE (February 2018)", 2019; "The State of LTE (November 2016)", 2019). Given that the literature review aims to understand the use cases of social media, it is essential to consider privacy aspects. GDPR (General Data Protection Regulation) is a regulation in EU law and contains enforcement on personal data and more ("General Data Protection Regulation", 2019). GDPR became applicable as of May 25th, 2018. The impression, acceptance and barriers of integration of social media into HE has changed since the release of data privacy regulations inside Europe, therefore making the work published before 2018 less relevant. Besides the factors mentioned previously, an LMS platform Brightspace announced their mobile application to be available to all regions in 2018 (D2L, 2018). With all the factors mentioned previously, scientific publications after 2018 are considered to give an accurate representation for this research.

It is necessary to identify the types of mobile devices used in the studies, as the definition of mobile learning does not have to overextend and should include mobile devices that any person can carry with them. This is why studies using laptops, netbooks, and stationary gaming consoles are excluded from this paper.

In total, 174 scientific papers were found on Scopus, 58 papers were found on ScienceDirect and 61 papers from IEEE Xplore. In total, seven Scopus works discussed SM use, one discussed HE apps, five ScienceDirect papers discussed SM use, five papers discussed HE apps, and last, from IEEE Xplore, seven works discussed SM, and four papers discussed HE apps. Out of 380 papers, 22 scientific works were excluded based on duplicates, 293 papers were outside of the scope for this research based on the abstract or title, and 34 papers were excluded based on criteria in Table 1. 31 papers that met all the selection criteria were selected for the analysis.

2.3   Analysis framework

The analysis framework for secondary qualitative data will use the following elements based on the research questions: 1) country of study, 2) educational context, 3) type of apps used (social media or HE apps), 4) enhancement of learning processes (of students), 5) types of mobile devices and 6) technological affordance.

2.3.1   Coding

The study in the literature review will be coded according to the study context: formal, informal and non-formal. Formal and informal learning was defined previously, and non-formal learning is learning that was not intended, e.g. learning in an environment that did not have a purpose of learning. Furthermore, for this study, it is essential to code the applications that are discussed in the paper (specific social media applications or higher education applications), types of mobile devices, educational context, subject domain, enhancement of learning processes, country of origin and technological affordance in order to identify groups of papers with related purposes. In particular, inductive coding will be used for that purpose (Saldaña, 2021), with an initial list of keywords being similar to the search terms. This list of keywords will be extended as more scientific publications are analysed.

3   Results and discussion

3.1   *What are the use cases of social media apps and higher education apps within the context of higher education?*

3.1.1   *Educational context*

From the coding of educational context, papers are divided into four categories: 1.) Informal learning. Papers that investigated the social media use for informal learning did not directly integrate the application into higher educational settings but investigate the use of social media for educational purposes by students. 2.) Formal learning. Scientific works in that category discussed social media learning within higher education. This involved the structural integration of social media into study activities and communication with instructors. 3.) Non-formal learning. Studies in this category involved unstructured learning using social media.

From the category of learning context, 11 studies investigated the use of both formal and informal learning of social media, seven studies investigated only informal learning, one study investigated formal, informal and non-formal learning, and two studies investigated only formal learning use of social media.

For instance, in the scientific work investigating the integration of WeChat into HE of China, teachers had to come up with their way of integrating (Xue & Churchill, 2020). One teacher (participant HX) focused solely on the formal use, which involved submitting assignments, while some other teacher (participant HXY) used WeChat for collaborative purposes. The different approaches offered show the flexibility of social media, and this is also clear from the literature coding on educational context.

In comparison, HE apps discussed in the literature focus solely on formal learning. This gives an idea that social media differ from HE applications in the learning context and have opposing environments. The coding of technological affordances supports this statement.

3.1.2 *Technological affordances*

The inductive coding that was used to code technological affordances included the following categories: 1.) Communication. This term entails that social media in higher education has a use case of communication. This includes both informal communications with peer students and formal communication with instructors. The study (Al-Hunaiyyan et al., 2018) found that over 80% of students agree that social media helps to strengthen communication with peer students and professors. 2.) Collaboration. This term refers to the students' collaboration: social media has the proper infrastructure for collaboration purposes. It includes group projects, collaborative problem solving and other related activities. For instance, LinkedIn was used as a social media platform to cooperate in a group project (Hamadi et al., 2021) 3.) Resources accessing & sharing. This technological affordance refers to the possibilities of both formal and informal resources exchange. It has been found that 27.1% used social media to complete information (Figueras-Maz et al., 2021), and other studies indicated formal resource sharing with course staff (Saputro et al., 2019) 4.) A motivating environment. Social media provides a possibility to create a motivating environment for students. 5.) Community-building. Social media entails the building of smaller communities between students. This allows students to find new connections with other students even if they do not know them. 6.) Distance teaching. Social media is an online tool and provides support for distance teaching. 7.) Course-related activities. Social media can be used for course-related activities provided good integration support from the instructors. Course-related activities include assignment submissions, timetables, quizzes and similar. An example of course-related activity is presented in the paper (Escamilla-Fajardo et al., 2021) which used a social media TikTok for assignment submission. An overview of technological affordances is provided in Figure 1. Y-axis represents the number of scientific works that support the category.
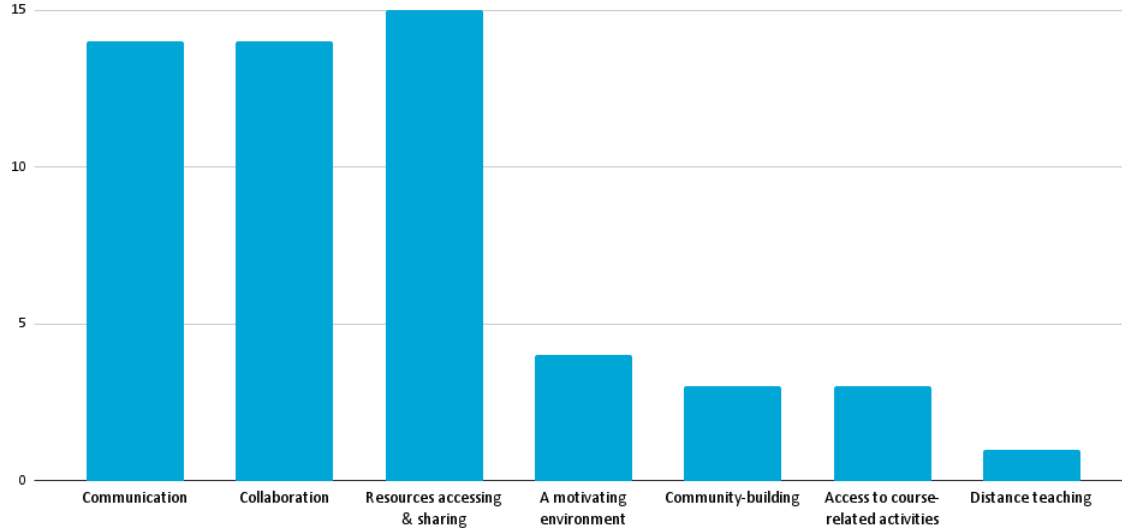

Figure 1: Technological affordances (SM apps)

From the technological affordances, the use cases of mobile learning can be derived. As indi-

6

cated by the literature coding on Technological affordances of SM, social media is a good tool for communication, collaboration and resources accessing and sharing. This all implies from the fact that social media is defined as a tool for creating and sharing content (Gikas & Grant, 2013). The aim is to integrate that into higher educational settings properly, as only one paper mentioned that it could be used for distance teaching, and three papers mentioned the use for course-related activities.

Besides that, four scientific works mentioned that social media in higher education creates a motivating environment. For example, it was mentioned that students perceive the integration necessary to increase their motivation in the educational process (Figueras-Maz et al., 2021). Another paper mentioned that SM learning provides students control over the education process and results in minimised anxiety, increase in confidence and promotes motivation (Ramakrishnan et al., 2019).
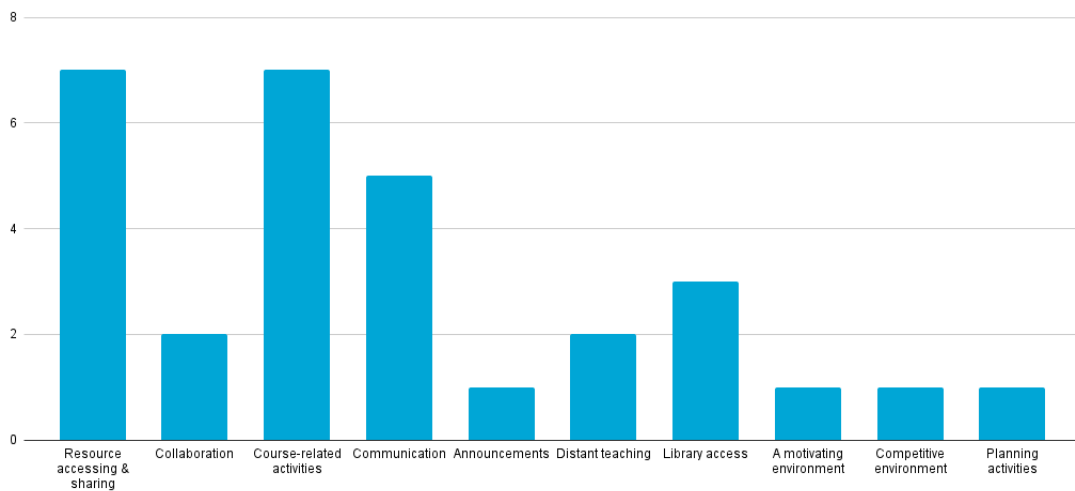

Figure 2: Technological affordances (HE apps)

In comparison to social media, mobile HE applications include familiar and different technological affordances. The technological affordances of HE apps are presented in Figure 2. As can be seen, HE apps are more learning-focused and provide course-related activities (quizzes, announcements, exams, assignments), as opposed to SM technological affordances. Depending on the nature of HE applications, they may also provide planning activities, library access and more. Gamified learning provides a competitive environment (Subhash & Cudney, 2018), which is not possible in social media. Most of the HE applications discussed in the literature provide students with communication channels and learning resources. For instance, a flipped smart application provides students with in-class collaboration, online resources for diverse learners and other functionalities (Khlaisang, 2018). The variety of activities possible in HE applications is determined by the higher institution, as the applications are developed for the purpose of studying.

It is therefore clear that social media has technological limitations compared to mobile HE applications. This is an expected outcome, as HE applications were developed with the purpose of doing study activities when personal social media applications were designed for solely informal

communication purposes. This makes social media a limited platform for higher education learning purposes but has opportunities to implement specific activities. It is also clear that some technological affordances used in HE apps can not be a part of social media, as they are private to the university. An example of that is library access, which was discussed in various scientific publications (Acheampong & Agyemang, 2021; Lau et al., 2020; S.K. et al., 2018). HE applications remain crucial to deliver learning activities and content.

3.1.3 *Enhancement of learning processes*

In the context of this paper, enhancement of learning processes refer to students' learning processes when they are using mobile SM learning and HE learning. After the inductive coding, the following categories were identified: 1.) Enhanced collaboration. 2.) Ease of study activities. 3.) Ease of resources accessibility. 4.) Enhanced communication. The enhancement of learning processes found follow from the technological affordances and are a logical continuation of the use cases of social media in the context of higher education. The overview of this is provided in Figure 3 below.
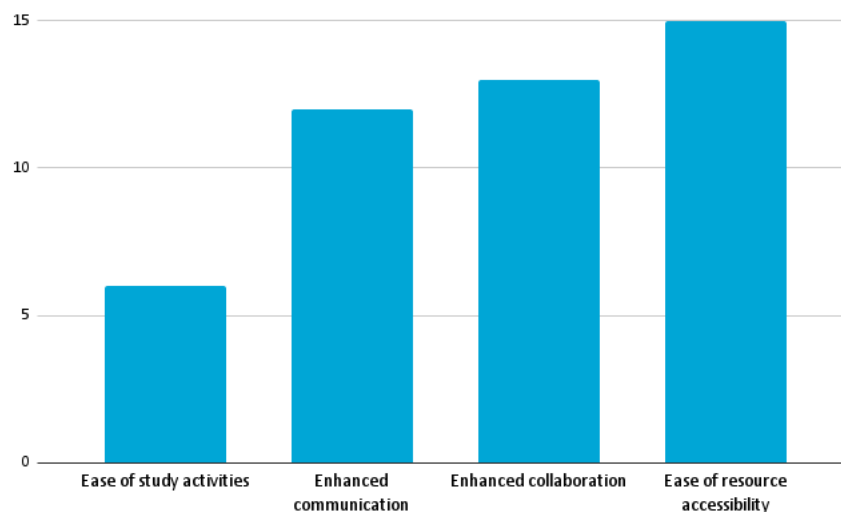

Figure 3: Enhancement of learning processes (SM apps)

The enhancements of HE apps mentioned in the literature found include the improvement of skills acquisition, the use of learning time, the ability to study, ease of resources accessibility, enhanced collaboration, enhanced communication and ease of study activities (El-Sofany & El-Haggar, 2020). The results indicate that mobile HE applications and social media share some of the benefits. Therefore both ways of implementing mobile learning benefit students.

To summarise the analysis of the sub-question one, from the literature review and the used coding, precise results can be concluded. As for the moment of writing this paper, limited studies showed the formal use of mobile social media in higher education settings. The formal learning-based functionalities not provided by SM include features provided by the learning management system and other HE applications: timetables, announcements, assignment submissions, and other course-

related activities mentioned previously. Social media does not provide the complete functionality of HE apps, and there exists a differentiation between the technological affordances of the two. In the context of formal learning, the literature review showed that social media was predominantly used as a tool to communicate with instructors, as indicated in Figure 2. For example, it was indicated that Twitter is used for communication purposes (Romero-Hall, 2021), another study that involved Facebook and WhatsApp mentioned that social media integration supports interactive learning and communication (Mahlambi et al., 2018) and similar findings were indicated in other studies. Very limited studies showed other formal uses of social media. For example, previously mentioned paper that used WeChat (Xue & Churchill, 2020) discussed the use of it for assignment submission and a paper that investigated the use of MobileMeeting for formal group projects (Zabidi et al., 2018).

The literature review indicated that social media is now predominantly used as an informal tool for communication, community building, collaborative purposes and resource sharing. This impacts the students' motivation, as indicated by multiple researchers (Figueras-Maz et al., 2021; Murire & Cilliers, 2019; Ramakrishnan et al., 2019; Xue & Churchill, 2020). The use cases for mobile social media learning are hence the following:

- Collaboration with peer students

- Communication with peer students and instructors

- Sharing of study material (notes, lecture slides and similar)

- Distance teaching

- Perform course-related activities

- Formation of student communities

3.2 What are the potentials and challenges of integrating social media into a higher education environment?

3.2.1 Advantages of mobile social media learning

From the literature review, one of the key objectives was the identification of the advantages of social media use as a learning tool in higher education. One of the advantages was previously mentioned: social media facilitates a collaborative environment. Out of the 21 papers that were reviewed, 13 of them mentioned it as an advantage. Besides that, nine papers mentioned that social media is a good tool for resources accessing and sharing, and nine papers mentioned that social media provides enhanced motivation. Seven scientific works mentioned that social media has the advantage of personal connection between students and instructors. The four main advantages of social media are: 1.) It facilitates a collaborative environment, 2.) It is a good tool for resource accessing and sharing, 3.) It enhances motivation, 4.) It creates a personal connection and bonding with instructors. It was shown that both instructors and students have a positive view on SM, as it shows a positive impact on students by deep learning experience, engagement, enhanced collaboration and organizational skills (Aburagaga et al., 2020). Similar findings are indicated in other papers, for instance using TikTok motivated students, as they could see work of other students being submitted to the platform, therefore being more engaged in doing so (Escamilla-Fajardo et al., 2021). An overview of the advantages of social media can be found in Figure 4.
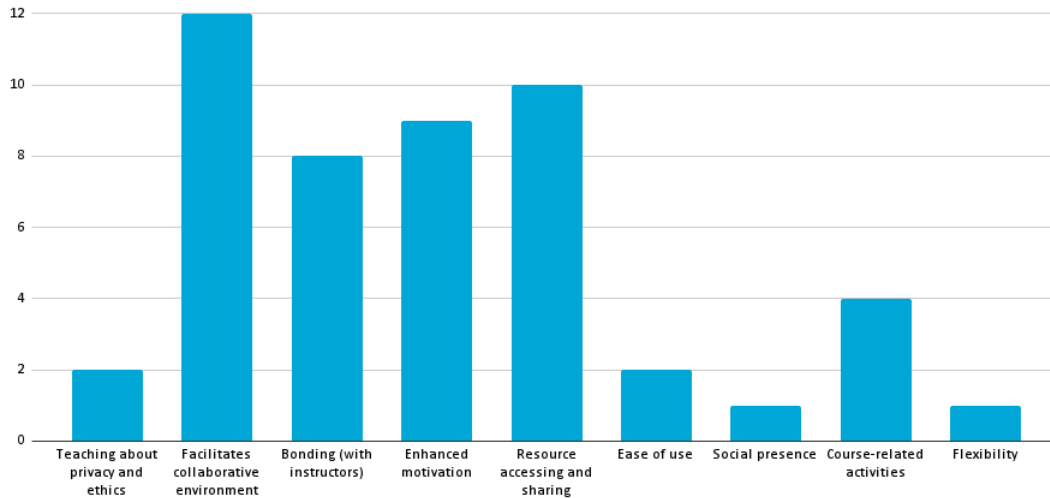
Figure 4: Advantages of social media learning

The advantages that were less frequently mentioned include: 1.) Flexibility, 2.) Social presence, 3.) Ease of use, 4.) Course-related activities, 5.) Teaching about privacy and ethics. Two scientific works mentioned that social media could be used as a tool to teach students about the use of data, privacy and ethics. For example, it was mentioned that answering essential questions about privacy and terms of service may encourage users to make knowledgeable decisions about their actions in social media (Krutka et al., 2019). It is an interesting approach towards social media integration, which was not considered in most of the publications. One scientific article mentioned that mobile ease of use has a direct influence over satisfaction (Ooi et al., 2018), and therefore over continued use, meaning that easy to use social media have a positive effect on acceptance of SM in HE settings.

3.2.2   *Barriers of mobile social media learning*

Likewise with advantages, mobile social media learning has barriers that influence the integration into higher education settings. From the literature review, nine scientific papers discussed the barriers facing social media integration. They include 1.) Digital divide. The digital divide includes various factors, but for this research, the digital divide refers to the difference in digital literacy. To successfully integrate SM into higher institutions, instructors and learners must have an equal understanding of the potentials of using social media for learning purposes (Romero-Hall, 2021). 2.) Data literacy. The use of data by social media companies is not always transparent, and user data may be misused (Krutka et al., 2019; Romero-Hall, 2021). 3.) Perception of social media. This barrier includes the perception of social media as a whole. Several researchers warned against the use of SM due to potential risks such as bullying, misinformation and more (Romero-Hall, 2021). 4.) Accessibility. Mobile learning entails accessibility, but it is not always the case that the internet or devices are accessible. It has been found that device access and institutional support are decision-makers to support SM integration (Aburagaga et al., 2020). 5.) Attitude towards social media. The teacher attitude towards social media plays a role in the integration process. Lecturers

attitude towards social media use in HE is a key enabling or disabling factor in the integration of SM (Murire & Cilliers, 2019). 6.) Privacy. Privacy refers to the connection between personal life and professional life. In the context of social media, students may not want to use their social media accounts for studying purposes (Figueras-Maz et al., 2021). 7.) Integration infrastructure support research. The importance of integration infrastructure support is indicated in many papers, stating that in order to integrate social media effectively, there needs to be a pre-defined integration strategy (Ramakrishnan et al., 2019). An overview of the current barriers is given in Figure 5.
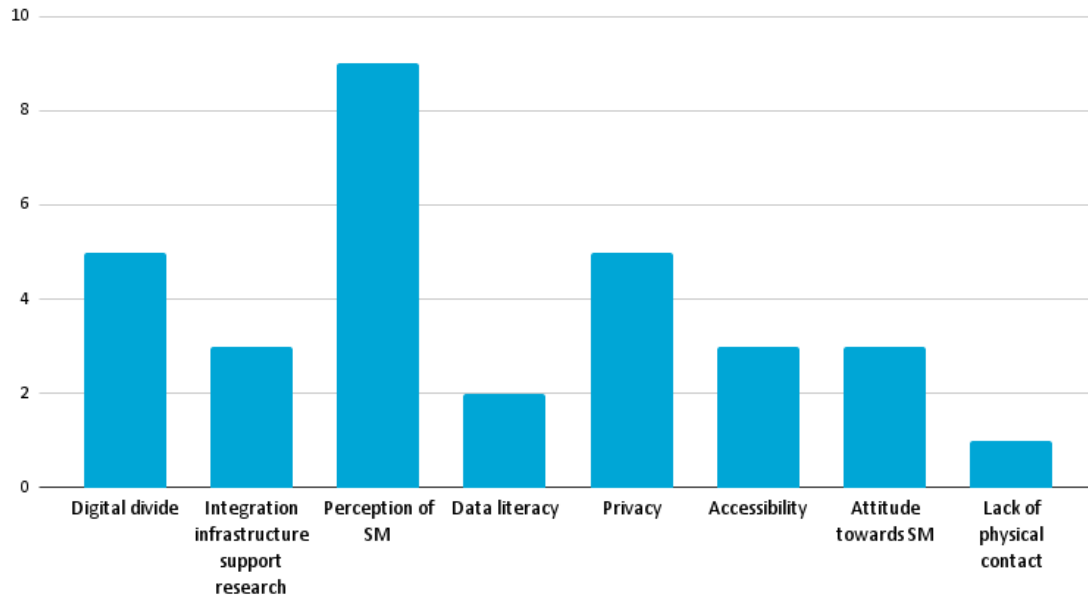

Figure 5: Barriers of social media learning

To summarise, these factors provide an accurate overview of the current situation of social media integration into HE settings. It is essential to mention that integration infrastructure support research plays a significant role in the process. Scientific works that mentioned the use of social media for course-related activities mostly integrated social media in a collaborative and planning way. An article mentioned MobileMeeting as a tool for video meeting purposes (Zabidi et al., 2018). MobileMeeting is a platform that provides functionality that can be used for online meetings and possibly lectures. In most of the studies found, social media was mainly used as collaborative learning tool.

This indicates that at the current state, social media has the use cases only when combined with other higher education apps (for example, with a learning management system). This is because social media does not have functionalities that are required in higher institutions, such as providing course content, interactive activities, file sharing, library access and similar, as indicated in the literature found (Acheampong & Agyemang, 2021; Khlaisang, 2018). Integration infrastructure support also plays a role in integrating SM in HE settings. As indicated in the research (Ramakrishnan et al., 2019), the choice of SM adoption is made by the academicians (instead of higher institutions)

and presents many challenges. Without a pre-defined way provided by higher institutions, it is difficult for instructors to come up with an effective way to integrate social media for their teaching purposes.

3.2.3 *Existing frameworks*

Two papers discussed the integration frameworks used to adapt social media in higher education. They used different frameworks and different social media.

One paper focused on the social media LinkedIn as a professional social media for formal collaboration purposes (Hamadi et al., 2021). The framework was developed for the purpose of the study and specifically for the integration of LinkedIn. The framework consists of 5 parts: 1.) Pedagogy type. 2.) SM Challenges. 3.) Mitigation. 4.) Implementation. 5.) Evaluation. To apply the framework, higher institutions first need to select a pedagogy approach. The next step is to identify and overcome the challenges that social media is facing. This includes privacy concerns and ambiguity. After the previous steps, follows implementation and evaluation.

The structured approach proposed by this model is a significant step towards implementing social media in higher education. The model suggests that individual institutions find a way to solve the barriers of social media integration.

Another paper that discussed the integration of social media to higher education took a less abstract and more functional approach (Molinari, 2017). The paper discussed three options: using social media, using On Line Communities (OLC) and social media together, and integrating social media functionalities inside OLC. Following, the paper provides an overview of the functionality of Facebook services and their relationship to OLC. The functionalities were therefore judged in the following way: + or ++ when OLC used in the study had a feature that was better implemented than the feature of Facebook, == when features were equivalent, and - or − when Facebook had a better feature or a feature that is not present. This functional approach allows us to compare social media and OLC (including LMS) and understand the best ways of integrating social media into higher education purposes.

3.2.4 *Extended framework*

For this research, a modified version of the framework discussed in the study (Molinari, 2017) is proposed. The framework was chosen due to its simplicity in understanding and usefulness. In the research, it was applied to one social media (LinkedIn). The extension of the social media list is expected to give an accurate representation of which features are better, worse or equally good implemented in different social media, with the purpose for higher institutions to be able to choose an appropriate social media platform for specific teaching purposes.

The framework developed in this research is reversed in the following way: extract the features provided by higher institutions, and judge the social media by presence or absence of the features. For this purpose, features found in the previous scientific publications (El-Sofany & El-Haggar, 2020; Ho et al., 2021; Khlaisang, 2018; S.K. et al., 2018) will be used.

The features are: Forum (**FOR**), Dynamic learning activities (**DLA**), Academic content (**ACT**), File system (**FS**), Announcements (**ANN**), Library access (**LA**), Internal and external assessment (**IEA**), Course search and registration (**CSR**), Calendar (**CAL**), Writing and receiving messages (**MSG**).

In order to integrate the functionalities appropriately, some of the features must be discarded. For example, doing any form of examination on social media is inappropriate, and this should remain

a feature of LMS. Therefore, the list of features to be considered is shortened to the following: FOR, DLA, ACT, FS, ANN, CAL and MSG.

The social media discussed more often in the literature review will be considered for the evaluation framework. They include Twitter, Youtube, Facebook, WhatsApp, Skype. A social media will receive judgement according to the integration framework. An overview can be found in Table 2.

	FOR	**DLA**	**ACT**	**FS**	**ANN**	**CAL**	**MSG**
Facebook	==	+	+	==	−	++	++
Twitter	++	+	++	++	−	+	++
Youtube	++	+	−	+	++	==	++
WhatsApp	==	++	+	==	==	-	++
Skype	+	+	−	+	+	-	++

Table 2: Social Media Ranking

This extended model of the existing model (Molinari, 2017) is expected to improve the integration process and choice of social media for the higher institutions. The social media platform selection for the analysis includes Facebook, Twitter, Youtube, WhatsApp and Skype. If used correctly with the integration model (Hamadi et al., 2021), this should ease the process of platform choice and integration and is expected to help to overcome some barriers introduced in this paper.

4   Limitations

The extended model, which analysed the features of social media platforms compared to HE applications, can likely include more social media. The selection is based on the literature review and contains the most common social media that was discussed. The limitation of the model also is in the subjective view of the topic: having different opinions on the research may insignificantly change the results. The extended model is based on the features that were found during the literature review. Therefore, the list of HE apps features can be extended to make it applicable to a wider range of higher institutions.

5   Conclusion

This paper discussed the use cases of social media in higher education, the differences between social media and HE apps in the learning environment and possible ways of integrating social media into it.

First research question was aimed to find and understand the use cases of social media in higher education. It has been found that social media has the following uses:

- Collaborative purposes - social media is simple to use for student collaboration purposes, as it provides multiple ways to interact, coordinate and cooperate. This has the opportunity to replace real-life meetings, which is especially helpful during the COVID-19 pandemic.

- Communication purposes - social media allows students to interact with instructors using social media, which increases the bonding with instructors and entails a more personal way of teaching.

- Resource accessing and sharing - With social media, students can exchange their knowledge and material in a fast and easy way.

- Other benefits of mobile social media learning include a motivating environment, the building of between-students communities, can be used for distance teaching and sometimes can be used for course-related activities.

The use cases of social media are limited, but they extend informal and formal learning and assuredly can be used combined with other learning tools.

Higher education apps are helpful for higher institutions, as they provide functionalities for planning, submitting assignments, access to the library and more. The main difference between social media and HE apps found in this paper indicates that some of the functionalities of HE apps can not be a part of social media within higher education. In the current state, this makes the usage of social media for learning purposes limited. However, it was found that social media has the benefits that HE applications do not have and, if used in a correct way, can improve learning performance and satisfaction. The main benefits include that SM facilitates a collaborative learning environment and enhanced motivation due to the social media literacy students have.

The second research question was aimed to look into existing integration of mobile learning into higher education, benefits, barriers and existing models. It was found that social media has barriers that higher institutions need to overcome, which include the perception of social media, digital divide, privacy concerns and others. Integration infrastructure support research is limited in the field, which is the main barrier that is currently faced.

This research focused on similarities and differences of social media in their use cases, learning context and enhancements of learning processes. The paper gives a clear overview of the current state of SM and HE applications usage and gives an overview of previously developed integration frameworks. One model is more conceptual and, on a general scale (Hamadi et al., 2021), while the second model looks into the details of integrating a specific social media (LinkedIn) into HE setting (Molinari, 2017). This paper extends the second model with the most common social media mentioned in the literature.

6   Implications and future work

The comparison of SM and HE apps provided in this paper gives a clear overview of the current state. The HE applications serve a learning purpose, while SM serves a collaborative and motivating environment. In combination with the two frameworks mentioned in the paper (one of which was extended), instructors may choose how to implement specific social media and know the barriers that have to be overcome beforehand.

Social media companies may refer to this paper to extend their applications' functionality to make it motivating for instructors to implement it in the learning environment. Some of the features are essential to LMS (like taking internal and external exams (Ho et al., 2021)), but others, if implemented correctly, may replace the functionality provided by HE applications.

Lastly, this paper mentioned the barriers of integrating social media into HE settings. With the barriers mentioned, the ways to overcome the barriers were not discussed in this research. There exist past researches that propose a solution to some of the mentioned barriers (Hamadi et al., 2021), but they were not the main focus of the work. Therefore, this research provides an overview of the barriers and may serve as a starting point for further research that analyses how to overcome them.

7 Responsible research

This paper is a systematic literature review that discusses the use cases of social media and the difference of use cases of social media and higher education applications. The most important part of a literature study is methodology. This required an appropriate selection of search terms, databases of scientific publications, selection of year range and method for analysis.

The search terms were selected based on the research question of this literature review: search terms related to social media, higher education, mobile applications and similar. After several trial searches, a concrete list of search terms was created. The search terms represent the main purpose of this research.

For the purpose of this research, three online databases were selected. The databases are IEEE Xplore Digital Library, Scopus and ScienceDirect. The databases ensure that the selected publications are of high quality and are peer-reviewed. ScienceDirect is suitable for e-books, while Scopus and IEEE contain scientific articles. Most of the papers in these databases are accessible using Delft University of Technology library access.

The year range selected for the literature review was chosen based on technological advancements in 2018 (4G mobile network availability and speed) and the application of data privacy protection laws ("General Data Protection Regulation", 2019). Using scientific publications in the literature review would possibly give different results related to social media usage.

All literature coding, excluding learning context coding, was done by utilizing inductive coding principles (Saldaña, 2021). The terms used to code were generated after reviewing the literature. After completing coding all of the findings, literature was grouped to create more generic coding. For example, impersonation within SM and distraction due to using SM combined into the category "Social media perception", included in "Barriers" found. A similar approach was taken for all of the codes discussed in the literature review. The coding process is reproducible based on the information provided in the paper.

Scientific publications used in the process of literature coding and analysis are cited in the "References" section using APA-7 citation style. Other publications mentioned in the research are cited in the "References" section as well as in the text.

In order to exclude any possible bias towards any desired outcome, this literature review was peer-reviewed by Esther Tan. Therefore, the results of this paper are considered objective.

Reproducibility of the research done is ensured by documenting steps of database selection, literature selection procedure and literature coding, the evidence of which is present in the methodology section, as well as throughout the findings and discussion section of this research.

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