Education and Information Technologies
https://doi.org/10.1007/s10639-020-10405-y

Integration of social media for smart pedagogy: initial perceptions of senior high school students in Ghana

Kwaku Anhwere Barfi, et al. *[full author details at the end of the article]*

Received: 2 July 2020 / Accepted: 30 November 2020/Published online: 03 January 2021

Abstract

Social media have become part of students' life as a result of their features and the predominant mobile smart medium of usage. In the advanced world, the social platforms have provided affordances for integration in education providing smart learning environments. However, within the Sub-Saharan African region, especially in Ghana, this phenomenon is emerging and warrants an investigation into the initial perceptions of students on integrating mobile phones and social media in the Ghanaian educational system. It is against this background that this study seeks to investigate senior high school students' perception of the use of social media for pedagogical purposes. Bandura's social learning theory and Vygotsky's social constructivism theory formed the theoretical foundation of the study. The descriptive survey design was adopted for this study with data collected through a questionnaire. In all, 200 students were selected from a senior high school using purposive and simple random sampling techniques. Statistical tools such as means, standard deviation, analysis of variance (ANOVA) and regression were employed for analysis. The study found that most of the students had positive perceptions towards the integration of social media and its effects on teaching and learning. There were no statistical differences in perception based on the mean scores of ages of students, year of study and programme of study in terms of social media integration in education and effects on teaching and learning. Furthermore, the perception on social media integration in education predicted the effects on integrating social media in teaching and learning. Consequently, both the perceptions of social media integration in education and its effects on teaching and learning predicted actual usage for learning. Based on the results recommendations were provided on policy and practice of social media use for academic purposes in secondary schools in Ghana.

Keywords Integration of social media · Smart pedagogy · Senior high school students · Perception

1 Introduction

The ubiquity of social technologies has rendered today's world as a global village and according to Verma (2018), the world in the image of a global village is as a result of

electronic independence which is inherently dependent upon internet connectivity. This has made knowledge communication relatively easier thereby facilitating communication amongst thousands of people. One of the prominent communication media as a result of the internet is the rise of social media (Laroche et al. 2012; Kietzmann et al. 2014).

Social media is a set of internet-based application that constructs technological foundation and permits the exchange of information (Kaplan and Haenlein 2010). It is reported that people exchange ideas, feelings, personal information, pictures and videos through the use of social media platforms (Khuan and David 2014). Social media encourage continuous and free sharing of ideas (Allen et al. 2014) and its implication on education cannot be overstated. It is reported that shy and introverted people have been found to feel comfortable engaging with colleagues using social media in comparison with face-to-face interaction (Desjarlais and Willoughby 2010, Voorn and Kommers 2013, Diraditsile and Samakabadi 2018, Ansari and Khan 2020).

Social media like Facebook, Linkedin, Pinterest, MySpace, WhatsApp and many others can influence the lives of many, particularly students. According to Ahmed (2016), for teachers, students, school management and parents, it is just a click of a button away which helps to them to communicate educational contents through social media. For students' engagement, usage of social media in learning is a very important phenomenon (Reuben 2008; Ivala and Gachago 2012; Diraditsile and Samakabadi 2018). Thus, the use of social media in education is applicable for students, parents and teachers in order to work collaboratively (Diraditsile and Samakabadi 2018; Ansari and Khan 2020). It is fun and useful if utilized appropriately. Commonly, the term social media is used for all related social sites and there are various social networking tools and resources available, which can enhance learning skills and make classrooms instructions more interactive (Owusu and Agatha 2015).

In a similar vein, Mohammad and Tamimi (2017) revealed that students are using social media to connect and interact with friends and others. Also, they use it to share knowledge, look for information and try to solve problems related to their academic activities. Thus, senior high students can adopt social media to perform different activities and tasks in order to enhance learning.

According to Sponcil and Gitimu (2013), many students use social media to communicate with family, friends and even strangers. Sponcil and Gitimu (2013) assert that the young generations have taken advantage of the technological trend whereby social media have created new and non- personal ways for people to interact.

There have been mixed reactions from academics and researchers with regard to the effect of social media platforms and how they affect students' academic performance. Studies have found that the participation of students on social media platforms may have both positive and negative impacts on their studies and, for that matter, their academic performance. In the study of Kirschner and Karpinski (2010), they found a negative relationship between Facebook use and academic performance. Facebook users reported lower mean GPAs and also reported spending fewer hours per week studying on average than Facebook non-users.

Similarly, a study conducted by Çolak (2014) revealed that social media utilisation affects students' academic life. The major negative effect of social media platforms according to the author is that students get so much involved in the social media platforms activities that they become addicts. Due to this addictive behaviour, students use social media platforms even in classrooms which creates disturbance for other

students and concentrating in class becomes difficult. Inability to carefully follow lectures affects their grades or performance (Choney 2010).

The use of the social media as channels of communication is a growing trend in Ghana. Social media are used as interaction medium and this helps users to be better informed, enlightened and kept abreast of world news (Asemah and Edegoh 2013; Sponcil and Gitimu 2013). According to Asemah and Edegoh (2013), technology is like two sides of a coin that brings both negative and positive attributes however, its integration for better educational outcomes cannot be overemphasized. While there are those who believe that social media in education undermines certain educational purposes (Tess 2013; Mohammad and Tamimi 2017), others are of the view that its effect on academic activities and achievement could not have come at a better time (Pimmer et al. 2012; Junco 2015). While these arguments will linger, the role of social media cannot be overstated especially in senior high schools (SHSs) in Ghana.

Students in the senior high schools in Ghana are not allowed to use mobile phones in schools; they use these smart technologies outside school (Essel et al. 2018). This is because; the ministry of education views the presence of mobile phones in schools as a distraction, even though literature (Stavert 2013; Cardoza and Tunks 2014; McLean 2016) support Bring Your Own Device (BYOD) (which includes smart technologies) to school policy. However, the advantages for using mobile phones for learning exceed the disadvantages (Darko-Adjei 2019). Senior high school students can use their mobile phones to do research, contact colleagues and teachers for assistance in the absence of classroom (face-to-face) interaction. Ability to use mobile phones also prepares them for tertiary education where they will need that skill for research purposes.

While the mobile phone policy in Ghanaian schools is unfavourable, literature supports the use of social media in education for better learning outcomes (Owusu-Acheaw and Larson 2015; Mensah and Nizam 2016; Kolan and Dzandza 2018). Additionally, some studies on social media usage among students have found that students use social media for communication, entertainment and to kill boredom (Duggan and Smith 2013; Pfeiffer et al. 2014). According to Mahama (2015), the introduction of mobile-enabled social media in education represents one of the modern and versatile forms of communication around today. This view was supported by Wankel (2011) that there is an increasing intersection of social media and education. This is because the social platform promotes learning participation which is viewed as a social construction of knowledge (Wankel 2011). According to Zhu et al. (2016) the twenty-first century classroom is a smart learning environment needed by students to develop their knowledge and skills. Consequently, the use of smart technologies in classroom to foster webquest, social interaction, engagement and knowledge construction based on collaboration and scaffolding recommended by the social constructivist paradigm (Vygotsky 1978), is of the essence. Although the education system in Ghana has witnessed various policy reforms, it is evident that progress towards the integration of social media for smart pedagogy learning has been slow for several reasons, as there are, for example, high costs of infrastructure and poor internet connections (Grimus and Ebner 2014; Kolan and Dzandza 2018; Owusu-Ansah and Yebowaah 2020). These studies concentrated on the types of social media platforms available, extent to which students in SHSs use social media platforms and the barriers SHSs encountered when using mobile devices for learning. While there is still engagement with the ministry of education on the use of smart phones in schools to aid in social learning and knowledge

construction, it is imperative to investigate senior high school students' initial perceptions on the use of mobile-based social media for educational purposes, since they utilize them in out of class pedagogical activities. Additionally, the tripartite relationships between perceptions on social media in education, perception on effects of social media on academic activities as well as actual use of social media needs an investigation to contribute to existing literature.

Specifically, the study seeks to achieve the following objectives:

1. Determine the perception of senior high school students towards the integration of social media in teaching and learning.
2. Examine the perception of senior high school students on the effects of integrating social media in teaching and learning.
3. Examine differences in students' perception on integration of social media and the effects on integrating social media in teaching and learning in terms of age, year of study and programme of study.

2 Research hypotheses

H1: There is a positive predictive relationship between perception on social media integration in teaching and learning, and the effects of social media on teaching and learning.

H2: There is a positive predictive relationship between students' perception on the effects of social media on teaching and learning, and actual use of social media.

H3: There is a positive predictive relationship between perception on effects of social media integration in teaching and learning, and usage of social media in teaching and learning.

3 Theoretical basis

This study adopted Bandura's social learning theory and Vygotsky's social constructivism theory. Social learning theory (SLT) posits that learning occurs in a social setting through observation using cognitive processes. Ainin et al. (2015), states that SLT basically explains how the environment affect individual learning and behaviour pattern. By this, individuals construct their own content and share them with others.

In relation to the SLT as stated by Bandura (1997), the use of the social media affects users' learning experiences and outcomes. This is supported by Ainin et al. (2015), who emphasized that individuals' behaviour are influenced through observing and interacting with others. It is the individuals' interaction with the environment that causes their behavioural changes. Therefore, when individuals interact with others on social media platforms, these result in behavioural outcomes which affect the individual positively or negatively. However, in education, the discourse in interaction on social media creates collaboration, engagement, self-confidence and effective teaching and learning especially amongst introverts while enhancing that of extroverts (Kearney et al. 2012). Thus, the use of social media appeals to varied learning styles (Balakrishnan and Gan 2016). This project a bi-directional effect of social media utilization for

pedagogical practices in education. Additionally, social constructivism stresses the reliance of the social milieu for interaction throughout the learning process (Qi 2019). The theory suggests that learning is a social process and hence learning that takes place through a social context becomes beneficial for learners to engage in construction of knowledge (Mishra 2014). This makes it important for the integration of social technologies and social media that promote such forms of learning in the twenty-first century (Javaeed et al. 2020). In support of this view is the theory of connectivism which emphasizes that knowledge resides in nodes of connections that are possessed by individuals through technologies (Siemens 2005). As knowledge travels through the various nodes made possible by social learning via social technologies, knowledge is constructed and refined for the benefit of all the connected community (Churcher et al. 2014). This promotes community of learning as reiterated by the community of enquiry framework and particularly the social presence aspect (Garrison 2007). The evolution of social media use in education seems to fulfill the principles of the social learning process (Gaytan 2013). As indicated by Mcloughlin and Lee (2010), social media facilitates participation, communication and collaboration and the construction of personal meaning that satisfies the learning condition of social constructivism (cited in Qi 2019).

4 Development of conceptual framework and hypotheses formulation

4.1 Relationship between perception on integration of social media in teaching and learning and the effects on integrating social media in teaching and learning

The integration of social media in teaching and learning enable students to share educational information and bookmark them for learning (Case 2012). In the view of Kolan and Dzandza (2018), there is a correlation between social media usage and academic performances and learning experiences of students. This indicates that there are relationship effects on the use of social media on teaching and learning. The perceived value of social media integration in education has an influence on how effective social media integration in teaching and learning will be. Some of the effects according to Rifkin et al. (2009) are enhanced relationship, improved learning, personalized learning, offers great deal of content posting for learning and support learning on the move. On the contrary, Owusu-Acheaw and Larson (2015) revealed that the use of social media negatively affects students' learning. However, this view was based on the independent use of social media against academic activities. According to Lytle (2012), students' perception of positive gains of high interactivity and grades influence their perception positively in terms of integration of social media in education. This study looks into the integration of social media in the teaching and learning process. Consequently, within this study, if students perceive that social media use in teaching and learning is a positive engagement, it will positively influence their perception on its effects on teaching and learning and vice–versa. Accordingly, this study hypothesizes that:

H1: *There is a positive predictive relationship between perception on social media integration in teaching and learning and the effects of social media on teaching and learning.*

4.2 Relationship between perception on integration of social media in teaching and learning and usage of social media

The emergent of social media in teaching and learning is significantly influencing the academic life of students. In the view of Boateng and Amankwa (2016), students have positive perception on social media and use them to excite critical thinking skills, collaborate with their colleagues and knowledge construction. This indicates that the more students perceive integration of social media in teaching and learning to be positive, the likelihood of utilizing the technology for pedagogical purposes or otherwise. Alhababi Alfadil et al. (2015) support this view and stated that positive or negative perception of social media use in academic activities influences students to utilize social media for such purposes. This was earlier supported by Lytle (2012) that students tend to use social media for academic learning when they view a positive impact on their learning experiences and outcomes. According to McCarthy and McCarthy (2014), when there is a perception of a task and technology fit in terms of using social media for academic activities, students are inclined to using the technology to achieve performance outcomes. This implies that the positive perception of social media integration in education has a propensity to promote social media use in the pedagogical process of students. Accordingly, this study postulates that:

H2: *There is a positive predictive relationship between perception on social media integration in teaching and learning and usage of social media in teaching and learning.*

4.3 Relationship between perception on effects of integrating social media in teaching and learning and usage of social media

Applying social media in teaching and learning offer a positive impact on the adoption of social media and open the door to the new days of learning and teaching for classroom instruction (Mukhari 2016). In the view of Maya (2015) and Osharie (2015), integrating social media in teaching and learning are problematic in its usage for academic life. The use of social media in education will enable students to contact with other colleagues with regard to their assignments and project presentations. Alhababi, Alfadil et al. (2015) indicated that the positive or negative perception of students towards the use of social media in education is incumbent on the how they view the potential impact of social media use in on their academic learning. Subsequently, Wankel (2011) opined that when social media enhances the learning experiences outside the classroom context, students tend to participate in its usage. McCarthy and McCarthy (2014) indicated that social media is perceived by students as a tool that promotes their engagement in pedagogical activities and improves their learning outcomes. This perception has a consequential positive influence on students to use social media for learning. In a study by Alabdulkareem (2015), both teachers and students viewed social media as a tool to enhance their educational experience and were willing to use it. The perception of positive effects of social media on student's learning processes induces their will to utilize such platforms for their academic activities. Hence this study hypothesizes that:

H3: *There is a positive predictive relationship between perception on effects of social media integration in teaching and learning and usage of social media in teaching and learning.*

The reviewed literature on the relationships among perception of social media integration in education, effects of integration and usage for teaching and learning, resulted in a conceptual framework. This is illustrated by Fig. 1.

5 Methodology

To achieve the aim of the study, the quantitative research approach was employed. Quantitative study enables the researcher to collect data and produce results out of it (Creswell 2014). Consequently, the descriptive survey design was adopted for this study. According to Doody and Bailey (2016) descriptive survey research design is the type that helps researchers to explain natural occurrences of events. Concomitantly, Cohen et al. (2011) indicated that this type of research design helps to collect data with the purpose of describing the nature of prevailing status.

The population consists of all students in a senior high school. However, only day students were selected because they have the opportunity to use mobile devices at home to study when they are out of school. At the time of data collection, the target population was three hundred and thirty-nine (399) day students.

Purposive sampling was used in selecting a representative of the target population per the objectives of the research. Purposive sampling according to Teddlie and Tashakkori (2003) and Johnson and Onwuegbuzie (2004) involves selecting certain units or cases based on specific purpose rather than randomly. Therefore, the researchers used Yamane (1973) formulae to determine the appropriate sample size for the study. Yamane (1973), however, is convinced that to select a sample that is representative of the population; a mathematical formula has to be followed. Thus, the study used Yamane's formula in the formulation of its sample size. This formula is given as $n = N/1 + N\ (e)^{2}$ where N is the total number of households and e is the margin of error (assumed to be 5% for this study). The details of the determination of the optimal sample size were with a population of 399-day students based on Yamane's formula. Thus, the sample for the study was 200 students. In all, 200-day students were randomly selected based on simple random sampling with the balloting technique. Questionnaire was then used to collect data for the study. The questionnaire consisted of six sections. These comprised demographic, knowledge of types of social media,

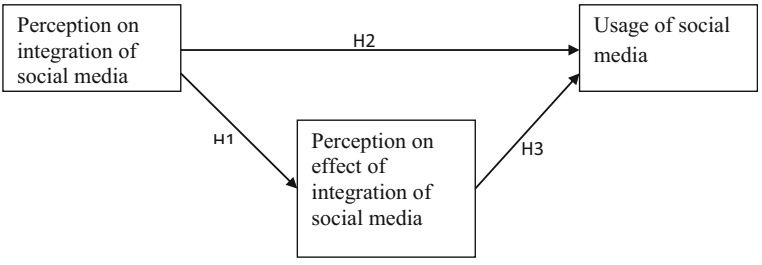

Fig. 1 Conceptual Framework

types of technological devices owned by students, use levels of social media, perception on social media use in teaching and learning and perception on effects of using social media in learning. Confirmatory factor analysis was used to confirm the items in the likert scale types of the instrument. Overall, the reliability coefficient of the instrument was 0.86 which is adequate according to recommendation by Cronbach (1990). IBM SPSS version 21.0 was used for the analysis of the collected questionnaire.

6 Analysis and findings

6.1 Demographic information

In terms of the sample, majority of the students were between 16 and 18 years ($n = 103$, 51.5%) and minority of them were between the ages of 19–21 ($n = 13$, 6.5%). Additionally, 60 (30.0%) were in the first year and 70 (35.0%) were in the second and third year respectively. The results reveal that, 49 (24.5%) of the respondents were Science students, 96 (48.0%) were Arts students and 55 (27.5%) were Business students. This is shown in Table 1.

6.2 Students' knowledge levels of the types of social media that are available

This sought to establish students' knowledge levels on the types of social media platforms. In doing that, items 4 to 15 of the questionnaire provided a list of some common emerging social media platforms from which respondents were required to tick the ones that they were familiar with. The details are represented in Table 2.

From Table 2, majority of the students knew about Facebook ($n = 189$, 94.5%) and YouTube ($n = 176$, 88.4%). WhataApp and Instagram were also well known by

Table 1 Demographic information of research respondents

Responses	Frequency	Percent
Age		
13–15 years	84	42.0
16–18 years	103	51.5
19–21 years	13	6.5
Year of study		
First year	60	30.0
Second year	70	35.0
Third year	70	35.0
Programme of study		
Science	49	24.5
Arts	96	48.0
Business	55	27.5

Table 2 Students' responses to the knowledge of the types of social media platforms available

Social Network Sites	Number of Responses	Percent
Facebook	189	94.5
Twitter	174	87.0
Instagram	173	86.5
WhatsApp	173	86.4
YouTube	176	88.4
Vine	61	31.4
Google +	172	87.3
Snapchat	171	85.9
Messenger	140	70.7
Viber	38	19.1
WeChat	81	41.3
Reddit	29	14.9

students ($n = 173$, 86.5%). The least known social media among the students were Reddit ($n = 29$, 14.9%) and Viber ($n = 38$, 19.1%).

6.3 Types of technological devices owned by students at senior high school

From Table 3, majority ($n = 132$, 66.0%) of the students owned smartphones and tablets ($n = 33$, 16.5%). The least owned technological devices among the students were desktop computers ($n = 9$, 4.5%). The details of the responses are provided in Table 3.

6.4 Extent to which students in senior high schools use social media

This sought to find out the extent to which students in senior high schools use social media. Respondents were given some statements to indicate the time they spent on the use of this social media. The main social media that were presented to students were Facebook, Twitter, Instagram, WhatsApp, YouTube, Vine, Google+, Snap Chat, Messenger, Vine, WeChat and Reddit, as these were the common networks used by the vast majority of the respondents. Frequency (counts) and percentages were used in

Table 3 Technological devices owned by students

Type of technological device	Frequency	Percent
Smartphone	132	66.0
Laptop	26	13.0
Tablet	33	16.5
Desktop computer (at home)	9	4.5
Total	200	100

Table 4 Respondents' duration spent on social media platforms

	Average 1 h a day n %	Average 2 h a day n %	Average 3 h a day n %	Average 4 h a day n %	Average 5 h a day n %	Average 6 h a day n %
Facebook	12 6.0%	20 10.0%	78 39.0%	63 31.5%	15 7.5%	12 6.0%
Twitter	32 16.2%	77 39.1%	44 22.3%	18 9.1%	15 7.6%	11 5.6%
Instagram	41 21.2%	70 36.3%	26 13.5%	23 11.9%	16 8.3%	17 8.8%
WhatsApp	15 7.7%	25 12.9%	19 9.8%	24 12.4%	88 45.4%	23 11.9%
YouTube	28 14.2%	68 34.5%	50 25.4%	25 12.7%	14 7.1%	12 6.1%
Vine	70 35.7%	76 38.8%	24 12.2%	10 5.1%	11 5.6%	5 2.6%
Google+	19 9.6%	41 20.7%	57 28.8%	68 34.3%	7 3.5%	6 3.0%
SnapChat	111 56.6%	46 23.5%	13 6.6%	14 7.1%	9 4.6%	3 1.5%
Messenger	40 69.0%	13 22.4%	4 6.9%	1 1.7%	–	–
WeChat	17 20.5%	47 56.6%	12 14.5%	6 7.2%	1 1.2%	–
Reddit	34 50.7%	23 34.3%	8 11.9%	2 3.0%	–	–

analyzing the data obtained from this portion of the questionnaire. The details are provided in Table 4.

Almost 71% of the respondents spent three and half hours on Facebook in a day, thus suggesting that majority of the respondents used Facebook on a daily basis. Similarly, more than (72%) of students spent 2 to 4 on the average on YouTube and almost 70% spent 4 to 6 a day on WhatsApp. Furthermore, 36% of the respondents spent an average of 2 h on Twitter.

Objective 1: Determine the perception of senior high school students towards the integration of social media in teaching and learning. The perceptions of senior high students towards the use of social media in teaching and learning are presented in Table 5.

From Table 5, it can be seen from responses to items (1, 2, 3, 6, 7, 8, 9, 10, 11 and 12), that students had positive perceptions towards the integration of social media in teaching and learning. It was only items (4 and 5) that students disagreed with the statements.

Objective 2: Examine the perception of senior high school students on the effects on integrating social media in teaching and learning. This objective intended to examine the views of students on how the use of social media for academic activities will affect teaching and learning. In attempt to do that, the students were asked series of questions. These questions range from relationship between academic friends, improved learning motivation, offer of great deal of content posting for learning and support learning whiles on the move. The responses were based on four-point Likert scale with the scale notation being disagree = 1, strongly disagree = 2, agree = 3 and strongly agree = 4. A mean score of 2.50 and above indicated positive perception and mean score of 2.49 and below showed negative perception. The outcome is presented in Table 6.

As provided in Table 6, all the mean scores showed that students had a positive perception on the effects of use of social media on teaching and learning.

Table 5 Perception of students toward integration of social media in teaching

Items	SA	A	SD	D	M	SD
1. Social media will promote discussion on topics taught in class	52 25.0	120 60.0	25 12.5	3 1.5	1.8	.66
2. Social media will stimulate me to do additional readings or research on topics discussed in class.	107 53.8	58 29.1	19 9.5	15 7.5	1.7	.96
3. Social media through discussions will assist me in understanding other points	45 22.8	87 44.2	39 19.8	26 13.2	2.2	.95
4. Social media can promote learning activities and assignments of a class which may lead to high learning expectations.	37 18.6	47 23.6	77 38.7	38 19.1	2.5	1.0
5. Social media will make feel part of a learning community in my class	32 16.1	59 29.6	84 42.2	24 12.1	2.5	.90
6. Social media will enable me to develop skills and knowledge from other colleagues	81 40.5	84 42.0	30 15.0	5 2.5	1.7	.78
7. Social media will enable me to develop problem solving through collaboration	115 57.5	55 27.5	21 10.5	9 4.5	1.6	.84
8. Collaborative learning in my view as result of social media complements a face-to-face learning environment	20 10.1	122 61.3	31 15.6	26 13.1	2.3	.82
9. Using social media is a pleasant way to communicate with my classmates	134 67.3	34 17.1	17 8.5	14 7.0	1.5	.91
10. It is easy to express what I want to communicate through social media	27 13.5	130 65.0	22 11.0	21 10.5	2.1	.79
11. Social media allow relationships to be establish based upon sharing and exchanging information	154 77.0	29 14.5	12 6.0	5 2.5	1.3	.70
12. Where I access information does not affect my ability to communicate with my colleagues	55 27.5	98 49.7	26 13.2	18 9.1	2.0	.882

Objective 3: Examine differences in students' perception on integration of social media, and the effects on integrating social media in teaching and learning in terms of age, year of study and programme of study Difference between the perception of students' in senior high school towards the integration of social media in teaching and learning were tested with relation to age, year of study and programme of study. This was to find out which demographic factors (i.e. age, year of study and programme of study) influenced the perception of students in senior high school towards the integration of social media in teaching and learning. To determine this, the mean score of

Table 6 Students' perception on the effects of integrating social media in teaching and learning

Statements	Mean	Std. Deviation
Significant relationship between academic friends	2.59	1.00
Improved learning motivation	2.68	0.99
Offers great deal of content posting for learning	2.81	1.00
Support learning whiles on the move	2.89	1.12
Promote understanding of learning content	3.05	0.13
Promotes high academic grades	3.12	0.23

Table 7 Results of the one-way ANOVA on differences in students' perception towards the integration of social media in teaching and learning in terms of age, year of study and programme of study

Factor	Categories	N	Mean	Std. Dev.	df	F	Sig.
Age	13–15	84	2.95	1.24			
	16–18	103	2.71	1.10	64	.82	.42
	19–21	13	2.10	1.01			
Year of study	First year	60	2.50	1.19			
	Second year	70	2.56	1.14	63	−.43	.64
	Third year	70	2.56	1.14			
Programme of study	Science	49	2.41	.98			
	Arts	96	2.98	1.14	63	.10	.90
	Business	55	2.91	1.11			

Significant ($p < 0.05$).

students' perceptions towards the integration of social media in teaching and learning on each of the factors was computed (see Table 7).

To answer this question, One-way analysis of variance (ANOVA) was used to test for significant difference between the perception of students' in senior high school towards the integration of social media in teaching and learning by age, year of study and programme of study. From Table 7, the One-way ANOVA test results on factors (i.e. age, year of study and programme of study) with regard to the perceptions of students' in senior high school towards the integration of social media in teaching and learning showed insignificance. This is confirmed by ($F = 0.82$, $p = 0.42$ at $p \geq 0.05$) for age; ($F = -0.42$, $p = 0.64$ at $p \geq 0.05$) for year of study and ($F = 0.10$, $p = 0.90$ at $p \geq 0.05$) for programme of study respectively. This indicates that there was no variation in responses of students towards their perception on social media integration in teaching and learning.

7 Research hypotheses

The relationships among perceptions of social media integration in teaching and learning, perception on effects of social media on academic activities and actual use of social media were tested based on regression analysis. The first hypothesis was tested by linear regression while the other two hypotheses were tested using multiple regression. These are shown by Tables 8 and 9 respectively.

H1: There is a positive predictive relationship between perception on social media integration in teaching and learning, and the effects of social media on teaching and learning.

This analysis in the study was to find out which demographic factors (i.e. age, year of study and programme of study) influenced the perception of students on the effects of integrating social media in teaching and learning. To determine this, the mean on the

Table 8 Linear regression analysis for perception on social media predicts the effects on integrating social media in teaching and learning

Variable	b	Beta (β)	R^2	t	Sig (p)
Step 1					
Constant	5.175			15.204	.000
Integration of social media	.420	.410	0.35	3.856	.002

Significant $_P \leq 0.01$ (1-tailed).

effects of integrating social media in teaching and learning on each of the factors was computed (see Table 10).

To answer the research question, the mean score on the effects of integrating social media in teaching and learning for each of the three demographic factors - age, year of study and programme of study. One-way analysis of variance (ANOVA) was used to test the null hypothesis that "there is no significant difference between the effects of integrating social media in teaching and learning" on age, year of study and programme of study. Table 10 present the One-way ANOVA test results on factors (i.e. age, year of study and programme of study) on the effects of integrating social media in teaching and learning.

The research question raised in this study was to find out which demographic factors (i.e. age, year of study and programme of study) affected the effects of integrating social media in teaching and learning. To determine this, the mean on the effects of integrating social media in teaching and learning on each of the factors was computed (see Table 10).

H2: There is a positive predictive relationship between students' perception on social media integration in teaching and learning and the effects of social media on teaching and learning.

As shown in Table 8, there was a significant predictive relationship between perception on social media integration in teaching and learning, and the effects of integrating social media in teaching and learning. This is justified by the statistics; $\beta = 0.410$, $t = 3.8$ at $p = 0.002$, $p \leq 0.01$. This indicates that students' perception on social media integration in pedagogy, actually predicted their perception on the effects of social media in the teaching and learning process. The positive relationship as indicated by the beta value (0.420),

Table 9 Multiple regression for perception on integration of social media and effects on integrating social media in teaching and learning predict usage of social media

Model	Unstandardized Coefficients	Unstandardized Coefficients		t	Sig.	Correlations	Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Tolerance	VIF
Constant	5.845	2.000		2.66	.005			
PISM	.410	.146	.325	2.84	.004	.590	.445	2.12
EISM	6.850	.096	.598	4.45	.000	.720	.445	2.12

Significant at $p \leq 0.01$ and at $p \leq 0.05$ NB: PISM = Perception on Integration of Social Media; EISM = Effects on Integration of Social Media.

Table 10 Results of the one-way ANOVA on differences in students' perception on the effects of integrating social media in teaching and learning based on age, year of study and programme of study

Factor	Categories	N	Mean	Std. Dev.	df	F	Sig.
Age	13–15	84	2.71	1.43			
	16–18	103	2.49	1.34	64	.94	.37
	19–21	13	2.19	1.13			
Year of study	First year	60	2.31	1.23			
	Second year	70	2.38	1.18	63	−.31	.59
	Third year	70	2.37	1.17			
Programme of study	Science	49	2.22	1.03			
	Arts	96	2.75	1.12	63	.13	.83
	Business	55	2.69	1.09			

Significant ($p < 0.05$).

means that as students' perception on social media improves, it has a rippling effect on their perceptions on the actual effects of social media on teaching and learning as well. The coefficient of determination (R^2) which is 0.35 provides an indication that perception on social media integration in teaching and learning alone, determines about 35% of variance in explaining the effects of social media in teaching and learning.

H3: There is a positive predictive relationship between perception on effects of social media integration in teaching and learning and usage of social media in teaching and learning.

This study further hypothesized that the perception on integration of social media and effects on integrating social media in teaching and learning will both predict usage of social media for pedagogical purposes. This was tested using a multiple regression model to validate the hypotheses as shown in Table 9.

The findings from Table 9 showed that both predictors in terms of students' perceptions on social media integration and effects of social media integration on teaching and learning were significant on actual usage of social media. This is justified by ($\beta = .598$, $p < .000$, $t = 4.45$) and ($\beta = .410$, $p < .004$, $t = 2.84$) respectively. Additionally, the relationships were strong based on the correlation coefficients ($r = 0.590$ and $r = 0.720$). Together, both predictors accounted for almost 60% (59.6%) variance in explaining the extent of usage of social media in teaching and learning. The statistics on the variance inflation factors (VIF) showed no collinearity effects in the measurement with an acceptable threshold of 2.12 (less than 3.3 as recommended by Kock (2015), Hair et al. (2017) and Field (2013) on each predictor variable.

8 Discussion on findings

This study sought to unravel the perceptions of senior high students towards the integration of social media in their teaching and learning processes. First, majority of

the students knew and used Facebook and YouTube as well as WhatsApp and Instagram for their personal purposes. However, platforms such as Reddit and Viber were least known and used by students. This popularity of Facebook, YouTube, WhatsApp and Instagram platforms by adolescents and youths is expressed in studies such as by Clement (2020) in his statistics on worldwide popularity of social media platforms. In support of the above, Kolan and Dzandza (2018) indicated that these latter social media platforms were popular in the Ghanaian higher education settings, a view shared by Ernest-Ehibubu and Sira (2017) in Nigeria in the study of Akakandelwa and Walubita (2017). The findings of the study have revealed that majority of the students in the senior high schools knew about Facebook, YouTube and WhatsApp as the available social media platforms. This supports the study of Jaffar (2014) who concluded that most students preferred using Facebook as an effective learning tool in searching for information on anatomy. Additionally, results from this study support Boyd and Ellison (2007), Liu (2010) and Gurcan (2015) assertion that students are knowledgeable in many social media, thus, reiterating, Evans (2014) assertion that most students are aware that social media are an innovative technology-based activity. The result of this study also implies that these social media platforms are not only popular among students in the tertiary institutions but however in the secondary schools as well.

Secondly, the types of technological devices owned by students were smart phones and tablets. The result confirms the findings from Akakandelwa and Walubita (2017) who stated that about 71% of students in Zambia owned smart phones and mostly use them to access social media platforms. A similar report was provided by Li et al. (2015) that in India where 70% of students used smart phones. As reported by Essel et al. (2018), students own various types of mobile devices, with smart phones and tablets recording high levels of ownership and this can be leveraged upon to promote smart learning. The finding in this study also supports the work of Alabdulkareem (2014) and Dahlstrom et al. (2013), who find out that most students owned smart phones and tablets. With majority of the students owning smart phones and tablets does suggest easy access to social media which could aid in learning opportunities through collaborative learning.

Additionally, majority of the students spent three and half hours a day using Facebook, YouTube and WhatsApp. Ernest-Ehibubu and Sira (2017) retorted that today, most students have Facebook accounts and use them for varied purposes. Similarly, Kirschner and Karpinski (2010) emphasized on the over-involvement and obsession of students on social media platforms. These findings are in line with other studies that associated students spending more times on Twitter (Roberts and Foehr 2008; Lin et al. 2013; Veletsianos 2013; Evans 2014; Visser et al. 2014), WhatsApp (Rithika and Selvaraj 2013) and Yahoo Messenger (Mehmood and Taswir 2013). The copiousness of use of social media platforms by students can be channeled into purposeful use by teachers through academic engagements via discussion, assignments and group projects (Essel et al. 2018). According to Apeanti and Danso (2014), students believe that it is more fun for teachers to reach out to them via social media for interaction and construction of knowledge which promotes engagement and critical thinking and academic well-being (Badri et al. 2017). Badri et al. (2017) further suggested that social media has now occupied a central position in the lives of our students and hence it can now be viewed as a learning platform that can be employed to facilitate students' engagement and performance.

Consequently, most of the students had positive perception towards the integration of social media in teaching and learning. There are a lot of researches that have shown that the use of social media supplement students learning (Gholami-Kordkheili et al. 2013; Lin et al. 2013; Alabdulkareem 2014; Guraya et al. 2014; Kind and Evans 2015; Galiatsatos et al. 2016).

The responses indicate that social media provide positive and significant relation between academic friends, improved learning motivation, offers great deal of content posting for learning and support learning whiles on the move, promotes understanding and improved academic grades. The findings of this study support the work of Kolan and Dzandza (2018) and Boateng and Amankwa (2016), who concluded that students have positive perception on the use of social media for learning. However, this finding contradicts studies conducted by Oye et al. (2012). They found that, in Malaysia, most students unconsciously got addicted to the use of social media and got obsessed with them for the wrong reasons. The positive perception of students on the integration of social media is a crucial step towards social media integration in the Ghanaian educational parlance as this perception will induce the willingness of students to channel the use of social media for academic purposes.

Furthermore, there were no differences in the mean scores in the categories of the various factors such as age, year of study and programme of study in terms of social media in teaching and learning. This could be attributed to fact that the students in the senior high schools had knowledge and use the types of social media available for their own personal and academic purposes, hence, a unified view on the perception of social media integration in academic activities. In addition, the age differentials were not wide since they are all adolescents and had a fair appreciation of social media use. They had a uni-directional response on the positive perception on social media integration in the teaching and learning process. However, this finding contradicts the work of Manca and Ranieri (2016) who concluded that ages of students correlate negatively with students' perception towards the use of social media in teaching and learning.

Similarly, there were no differences in the mean scores in the categories of the various factors, age, year of study and programme of study in terms of the perception of the effects of social media on teaching and learning This could be attributed to fact that the students in the senior high schools had a unified positive knowledge on the effects of integrating social media in teaching and teaching. The finding of this study is at variance with that of Wolfe (2013) who reported that there was a minimal correlation between the effects of integrating social media in teaching and learning by year of study and course of study.

Notwithstanding, all the three hypotheses formulated were sustained in this study because they were significant. The results showed that students' perception on social media predicts their onward perception on the effects of integrating social media in teaching and learning. Thus, a positive view of the relevance of social media use had a predictive influence on how students further perceived the effects of using social media for teaching and learning. The positive relationship implies that as students view social media as a positive tool for learning, it promotes their perceptions on how the social interaction tool will positively impact on their learning. Thus, supporting the views of Kolan and Dzandza (2018) and Lytle (2012) on the positive impact of perception on effects of social media usage on students' learning but rather contradicts the views of Owusu-Acheaw and Larson (2015). The result implies that students are already

motivated to use social media in their learning precipitated by the perception of positive effects on their academic endeavours.

Finally, a multiple regression analysis conducted to assess the hypothesized perception on integration of social media and the effects on integrating social media in teaching and learning predicting usage of social media were statistically significant. Both the perceptions on integration of social media as well as the effects of integrating social media in the teaching and learning processes were valid predictors of actual usage of social media in teaching and learning. The findings were consistent with previous studies by Alfadil et al. (2015) and McCarthy and McCarthy (2014) who concluded that students' perception on the use of social media and integration predicts students' usage of social media for academic learning. Results from other authors (Alfadil et al. 2015, Alabdulkareem, 2015, Maya 2015 and Osharie 2015) are in congruence with the predictive ability of the perception on the effects of social media in teaching and learning on actual usage of social media. The results provide an indication that students' positive perceptions on the integration of social media with its accompanying positive effects are quintessential in promoting the actual usage of social media platforms for the purposes of pedagogy. As students' perceptions on social media integration and effects improve, they are motivated to further use the platform for pedagogical practices. The strong predictive relationship between the exogeneous variables and social media use is confirmed by the coefficient of determination (R^2) which explained about 60% of variance in social media use. In variably, perceptions of social media and effects of usage become the precursor of actual usage of such platforms to support their academic activities.

9 Recommendations

The recommendations relate to the objectives of the study. The research indicated that most students use social media for personal and academic activities. Students should be encouraged by educational stakeholders on how to continue using social media as a tool for collaborative learning. For instance, by enabling students to have informal discussions about assignments and project work. Also, students should be encouraged to continue to use the good side of social media for their academic activities and connect with people who will be of help in their studies and innovations.

Moreover, all stakeholders in education should be involved in educating students on the proper use of social media for their academic work. Again, the ministry of education can reconsider its decision on the use of mobile phones in senior high schools for collaborative learning via social media. Additionally, social media use via smart phones in schools can be well monitored and structured such as way that it will be geared towards academic work. Finally, in theory, the results of this study confirm the perspectives of Bandura's social learning theory as well as the social constructivist learning paradigm.

10 Limitations of the study

The data was collected from a single source hence, care should be taken when generalizing the results, although it suites a developing country context. Again, the study was limited to only senior high school students in Ghana without considering the

views of the tutors and this might affect the results in the study. Finally, one particular platform was not used within this study and so it provided a unified view on most social media platforms for teaching and learning.

11 Suggestions for further research

Based on the findings of the study, the researchers recommend further studies be carried out in other regions with larger sample sizes to confirm or otherwise the results in this study. Additionally, teachers should also be used as respondents in order to verify if the results are parallel to this study.

Furthermore, a particular social media platform can be studied in-depth in terms of usability to project its importance to students relative to academic experiences. An experimental study can be carried out on the effects of social media use for academic activities between students who use the platform and those who do not.

12 Conclusions

It can be concluded based on the findings of the study that there are a lot of social media platforms that are available for use by senior high school students. The kind of social media platforms that majority of the students know were Facebook, You Tube, WhatsApp and Instagram. The results revealed that most of the students possess smartphones. From the results, it was realized that each of the respondents owned at least one of the technological devices considered in the study (i.e., smartphone, tablet, laptop and desktop computer at home). Similarly, majority of the students averagely used Twitter, YouTube, WhatsApp, Facebook, Vine, Viber, WeChat and Instagram account averagely two hours a day.

Social media can serve as a useful medium for classroom instructions, if properly used. Therefore, senior high students should be guided to use social media properly to enhance their academic performance. Furthermore, the senior high school students' perception toward the integration of social media and the effects on integrating social media in teaching and learning is uniform but not based on age, year of study and programme of study. This implies that the integration of social media in classrooms is a necessity for all categories of students in the senior high schools. Another indication is that senior high school students have positive perception and knowledge on the use of social media in teaching and learning.

Additionally, the perceptions on social media correlate with and predict the effects on integrating social media in teaching and learning. Finally, the perception on integration of social media and its effects on integrating social media in teaching and learning predict the extent of usage of social media. This suggests that the selected senior high students were knowledgeable on the use of social media for learning and appreciated its effects on their education. Hence, they will prefer to use social media in the teaching and learning process.

Acknowledgments We express our sincere gratitude to all the students at Kumasi Senior High School who participated in the provision of responses to the questionnaire items of this study.

Authors' contributions All authors developed and fine-tuned the topic for the study. However, the first author KAB developed the instrument and collected the data. All authors provided the writing of the introduction, objectives, theoretical review, conceptual development and hypotheses formulation. KAB developed the methodology with assistance from the other authors (BB and VA). KAB provided the statistical analysis, but the write up on the interpretations and discussion on findings were done by all three authors. Finally, all three authors read and approved the final manuscript.

Availability of data and materials The datasets generated during generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Compliance with ethical standards

Competing interests The authors declare that they have no competing interests.

References

Ahmed, R. (2016). Social media integration in secondary education in Pakistan. *Journal of Education and Educational Development, 3*(1), 74–97.

Ainin, S., Naqshbandi, N. M., Moghavvemi, S., & Jaafar, N. I. (2015). Facebook usage, socialization and academic performance. *Computers & Education, 83*, 64–73.

Akakandelwa, A. and Walubita, G. (2017) Students' social media use and its perceived impact on their social life: A case study of the University of Zambia. *The International Journal of Multi-Disciplinary Research, ISSN: 3471-7102.* Paper-ID:CFP/359/2017.

Alabdulkareem, S.A. (2014) Exploring the use and the impacts of social media on teaching and learning science in Saudi. *4th World Conference on Educational Technology Researchers, WCETR-2014,* Procedia – Social Behavioral Science, 182, 213–224.

Alfadil, M., Alzamanan, A. and Williams, M.K. (2015) Students' perception on the use of social media on their academic learning. *Conference: In proceedings of e-learn: World conference on e-learning in corporate, government, healthcare and higher education (pp. 1211-1217).* Chesapeake, VA: Association for the Advancement of computing in education (AACE). At: In Kona, Hawaii, United States.

Allen, K., Ryan, T., Gray, D., McInerney, D., & Waters, L. (2014). Social media use and social connectedness in adolescents: The positives and the potential pitfalls. *Australian Educational and Developmental Psychologist, 31*(1), 18–31.

Ansari, J. A. N., & Khan, N. A. (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environment, 7*(9). https://doi.org/10.1186/s40561-020-00118-7.

Apeanti, W. O., & Danso, E. D. (2014). Students' use of social media in higher education in Ghana. *Innovative Journal, 3*(1), 3–9.

Asemah, E. S., & Edegoh, L. O. (2013). Influence of new media sexual contents on the sexual behaviour of Kogi State University students. *Journal of Research and Contemporary Issues, 7*(1& 2), 22–40.

Badri, M., Nuaimi, A. A., Guang, Y., & Rashedi, A. A. (2017). School performance, social networking effects, and learning of school children: Evidence of reciprocal relationships in Abu Dhabi. *Telematics and Informatics, 34*, 1433–1444. https://doi.org/10.1016/j.tele.2017.06.006.

Balakrishnan, V., & Gan, C. L. (2016). Students' learning styles and their effects on the use of social media technology for learning. *Telematics and Informatics, 33*(3), 808–821.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Boateng, R. O., & Amankwa, A. (2016). The impact of social media on student academic life in higher education. *Global Journal of Human-Social Science: G Linguistics & Education, 16*(4).

Boyd, D., & Ellison, N. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 1–11.

Cardoza, Y., & Tunks, J. (2014). The bring your own technology initiative: An examination of teachers' adoption. *Computers in Schools, 31*, 293–315. https://doi.org/10.1080/07380569.2014.967626.

Case, D. O. (2012). *Looking for information* (3rd ed.). Bingley: Emerald.

Choney, S. (2010) Facebook use can lower grades by 20 percent, study says. Available at:http://www.msnbc.com/id/39038581/ns.technology_and_sciencetech_and_gadgets/. (Accessed: 20 August 2019).

Churcher, M. A., Downs, E., & Tewksbury, D. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media use. *The Journal of Effective Teaching, 14*(1), 33–50.

Clement, J. (2020) Global social networks ranked by number of users 2020. Available at: https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/. (Accessed: 20 November 2019).

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). New York, NY: Routledge.

Çolak. (2014). To what extent do social networking sites affect students' academic lives? Bilkent University.

Creswell, J. W. (2014). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Thousand Oaks, CA: Sage.

Cronbach, L. J. (1990). *Essentials of psychological testing* (5th ed.). New York: Harper & Row.

Dahlstrom, E., Walker, J. and Dziuban, C. (2013) *ECAR study of undergraduate students and information technology*. Louisville, CO: EDUCAUSE Center for Analysis and Research. Retrieved from: Available at: https://net.educause. Edu/ir/library/ pdf/ERS 1302/ERS1302.Pdf. (Accessed: 10 September 2019).

Darko-Adjei, N. (2019) The use and effect of smartphones in students' learning activities: Evidence from the University of Ghana, Legon. *Library Philosophy and Practice (e-journal)*. 2851. Available at: https://digitalcommons.unl.edu/libphilprac/2851. (Accessed: 14 July 2019).

Desjarlais, M., & Willoughby, T. (2010). A longitudinal study of the relation between adolescent boys' and girls' computer use with friends and friendship quality: Support for the social compensation or the rich-get-richer hypothesis? *Computers in Human Behavior, 26*(5), 896–905. https://doi.org/10.1016/j.chb.2010.02.004.

Diraditsile, K., & Samakabadi, G. G. (2018). The effect of social media on student engagement and collaboration: The use of Facebook at the University of Botswana. *Lonaka Journal of Learning and Teaching, 9*(1), 70–82.

Doody, O., & Bailey, M. E. (2016). Setting a research question, aim and objective. *Nurse Researcher, 23*(4), 19–23.

Duggan, M. and Smith, A. (2013) Cell Internet use 2013. Pew Internet & American Life Project. Available at: http://pewinternet.org/Reports/2013/Cell-Internet.aspx. (Accessed: 25 September 2019).

Ernest-Ehibubu, I., & Sira, T. V. (2017). Influence of WhatsApp and Facebook social media usage on academic performance of secondary school students in Port Harcourt local government area, Rivers state, Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 22*(12), 07–13. https://doi.org/10.9790/08372212050713.

Essel, H. B., Nunoo, F. K., Tachie-Menson, A., & Amankwa, J. O. (2018). Higher education students' ownership and usage of smart phones and tablets: The case of Kwame Nkrumah University of science and technology (KNUST). *International Journal of Educational Technology, 5*(1), 20–28.

Evans, C. (2014). Twitter for teaching: Can social media be used to enhance the process of learning? *British Journal of Educational Technology, 45*(5), 902–915.

Field, A. (2013). *Discovering statistics using SPSS* (4th ed.). London: SAGE.

Galiatsatos, P., Porto-Carreiro, F., & Hayashi, J. (2016). The use of social media to supplement resident medical education–the SMART-ME initiative. *Medicine Educational Online., 21*(1), 29332.

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61–72.

Gaytan, J. (2013). Integrating social media into the learning environment of the classroom: Following social constructivism principles. *Journal of Applied Research for Business Instruction, 11*(1), 1–6.

Gholami-Kordkheili, F., Wild, V., & Strech, D. (2013). The impact of social media on medical professionalism: A systematic qualitative review of challenges and opportunities. *Journal of Medicine Internet Research, 15*(8), 184.

Grimus, M. and Ebner, M. (2014) Learning with mobile devices perceptions of students and teachers at lower secondary schools in Austria. *In* Proceedings of world conference on educational multimedia, hypermedia and telecommunications (pp. 1600–1609). Chesapeake, VA: AACE.

Guraya, S. S., Guraya, S. Y., & Habib, F. A. (2014). Learning styles of medical students at Taibah University: Trends and implications. *Journal of Research on Medicine Science, 19*(12), 1155–1162.

Gurcan, H. I. (2015). Contribution of social media to the students' academic development. *International Journal of Information and Education Technology, 5*(12), 965–968.

Hair, J. F., Hult, G. T., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling* (2nd ed.). Thousand Oaks: Sage.

Ivala, E., & Gachago, D. (2012). Social media for enhancing student engagement: The use of Facebook and blogs at a university of technology. *South African Journal of Higher Education, 26*(1), 152–167.

Jaffar, A. A. (2014). Exploring the use of a Facebook page in anatomy education. *Anatomy Science Education, 7*(3), 199–208.

Javaeed, A., Kibria, Z., Khan, Z., & Ghauri, S. K. (2020). Impact of social media integration in teaching methods on exam outcomes. *Advanced Med Educational Practical, 11*, 53–61. https://doi.org/10.2147/AMEP.S209123.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*, 14–26.

Junco, R. (2015). Student class standing, Facebook use, and academic performance. *Journal of Applied Developmental Psychology, 36*, 18–29.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons, 53*(1), 61.

Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology, 20*, 14406. https://doi.org/10.3402/rlt.v20i0/14406.

Khuan, C. T., & David, L. G. (2014). A study on the ramifications of social networks on under & post graduate students. *Australian Journal of Educational Technology, 23*(4), 413–424.

Kietzmann, J., Hermkens, K., McCarthy, I. P., & Silvestre, B. (2014). Social media? Get serious! Understanding the functional building blocks of social media. *Business Horizons, 54*(3), 241–251.

Kind, T., & Evans, Y. (2015). Social media for lifelong learning. *International Review Psychiatry, 27*(2), 124–132.

Kirschner, P. A., & Karpinski, A. C. (2010). Facebook and academic performance. *Computers in Human Behavior, 26*(6), 1237–1245.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration (IJeC), 11*(4), 1–10.

Kolan, J.B. and Dzandza, P.E. (2018) Effect of social media on academic performance of students in Ghanaian universities: A case study of University of Ghana, Legon. *Library Philosophy and Practice* (e-journal). Available at: https://digitalcomm-ons.unl.edu/libphilprac/1637. (Accessed: 12 March 2020).

Laroche, M., Habibi, M. R., Richard, M. O., & Sankaranarayanan, R. (2012). The effects of social media-based brand communities on brand community markers, value creation practices, brand trust and brand loyalty. *Computers in Human Behavior, 28*(5), 1755–1767.

Li, Y., Zhang, M., Bonk, C. J., & Guo, Y. (2015). Integrating MOOC and flipped classroom practice in a traditional undergraduate course: Students' experience and perceptions. *International Journal of Emerging Technologies and Learning, 10*, 4–10.

Lin, M. F., Hoffman, E. S., & Borrengasser, C. (2013). Is social media too social for class? A case study of twitter use. *Tech Trends, 57*(2), 39–45.

Liu, Y. (2010). Social media tools as a learning resource. *Journal of Educational Technology Development and Exchange, 3*(1), 101–114.

Lytle, R. (2012) *Students' Perception on the Use of Social Media on Their Academic Learning.* Available at: https://www.researchgate.net/ publication/ 307167710 Students%27Perception_on_the_Use_of_Social_Media_on_Their_Academic_Learning (Accessed: 05 February 2020).

Mahama, B. (2015) The use of social media among senior high school students in Ghana: A study of armed forces senior high/technical school. Thesis submitted to the University of Ghana, Legon.

Manca, S., & Ranieri, M. (2016). Facebook and the others: Potentials and obstacles of social media for teaching in higher education. *Computers and Education, 95*, 216–230. https://doi.org/10.1016/j.compedu.2016.01.012.

Maya, K. G. (2015). Achievement scripts, media influences on blacks' students' academic performance, self-perceptions and carrier interests. *Journal of Black Psychology, 42*(3), 195–220. https://doi.org/10.1177/0095798414566510.

McCarthy, R., & McCarthy, M. (2014). Student perception of social media as a course tool. *Information Systems Education Journal, 12*(2), 38.

McLean, K. J. (2016). The implementation of bring your own device (BYOD) in primary [elementary] schools. *Frontiers of Psychology, 7*(1739), 1–3. https://doi.org/10.3389/fpsyg.2016.01739.

McLoughlin, C., & Lee, M. J. (2010). Personalized and self-regulated learning in the web 2.0 era: International exemplars of innovative pedagogy using social software. *Australasian Journal of Educational Technology, 26*(1), 28–43.

Mehmood, S., & Taswir, T. (2013). The effects of social networking sites on the academic performance of students in college of applied sciences. *International Journal of Arts and Commerce, 2*(1), 111–125.

Mensah, S. O., & Nizam, I. (2016). The impact of social media on students' academic performance: A case of Malaysia tertiary institution. *International Journal of Education, Learning and Training, 1*(1), 14–21.

Mishra, R. K. (2014). Social constructivism and teaching of social science. *Journal of Social Studies Education Research, 5*(2), 1–13.

Mohammad, H., & Tamimi, H. (2017). Students' perception of using social networking websites for educational purposes: Comparison between two Arab universities. *International Journal of Managing Information Technology, 9*(2), 13–26.

Mukhari, S. S. (2016). Teachers' experience of information and communication technology use for teaching and learning in urban schools. Doctoral thesis submitted to the University of South Africa. Pretoria.

Osharie, P. (2015) Social media and academic performance of students, conference paper of January 2015. Available at: https://www.researchgate.net/ publication/ 273765340. (Accessed: 10 December 2019).

Owusu, A., & Agatha, G. L. (2015) Use of social media and its impacts on academic performance of tertiary students. A case study of Koforidua polytechnic, Ghana. *Journal of education and practice,* 6. Available at: https://www.iiste.org/journals/ndex.php/JEP/article/view/20048. (Accessed: 12 March 2020).

Owusu-Acheaw, M., & Larson, A. G. (2015). Use of social media and its impact on academic performance of tertiary institution students: A study of students of Koforidua polytechnic, Ghana. *Journal of Education and Practice, 6*(6), 94–101.

Owusu-Ansah, C. M., & Yebowaah, F. A. (2020). Evaluating the information access skills of students of a College of Education in Ghana. *Journal of Information Science Theory and Practice, 8*(2), 45–54.

Oye, N. D., Mahamat, A. H., & Rahim, N. Z. (2012). Model of perceived influence of academic performance using social networking. *International Journal of Computers and Technology, 2*(2), 24–29.

Pfeiffer, C., Kleeb, M., Mbelwa, A., & Ahorlu, C. (2014). The use of social media among adolescents in Dar Es Salaam and Mtwara, Tanzania. *Reproductive Health Matters, 22*(43), 178–186.

Pimmer, C., Linxen, S., & Gröhbiel, U. (2012). Facebook as a learning tool? A case study on the appropriation of social network sites from mobile phones in developing countries. *British Journal of Educational Technology, 43*, 726–738.

Qi, C. (2019). Social media usage of students, role of tie strength and perceived task performance. *Journal of Educational Computing Research, 57*(2), 385–416. https://doi.org/10.1177/0735633117751604.

Reuben, R. (2008) The use of social media in higher education for marketing and communications: A guide for professionals in higher education. eduGuru, august 19. Available at: http://doteduguru.com/id423-social-media-uses-higher-education-marketing-communication.html. (Accessed: 27 November 2019).

Rifkin, W., Longnecker, N., Leach, J. and Ortia, L. (2009) Motivate students by having them publish in new media: An invitation to science lecturers to share and test. A paper presented at the motivating Science Undergraduates: Ideas and Interventions, UniServe Science Proceedings. Retrieved from citeseerx.ist.psu.edu.

Rithika, M., & Selvaraj, S. (2013). Impact of social media on students' academic performance. *International Journal of Logistics and Supply Chain Management Perspective, 2*(4), 636–640.

Roberts, D. F., & Foehr, U. G. (2008). Trends in media use. *Future of Children, 18*, 11–37.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1), 3–10.

Sponcil, M., & Gitimu, P. (2013). Use of social media by college students: Relationship to communication and self-concept. *Journal of Technology Research, 4*, 1–13.

Stavert, B. (2013) Bring your own device (BYOD) in schools: 2013 literature review. Sydney, NSW: New South Wales Department of Education and Communities (*PDF) The Implementation of Bring Your Own Device (BYOD) in Primary [Elementary] Schools*. Available at: https://www.researchgate.net/ publication /310392229_The_Implementation_of_Bring_Your_Own_ Device_ BYOD_in_ Primary_Elementary_ Schools. (Accessed: 05 May 2020).

Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioural sciences. *Handbook of mixed Methods in Social & Behavioural Research, 2*, 3–50.

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual): A literature review. *Computers in Human Behavior, 29*, A60–A68.

Veletsianos, G. (2013). Higher education scholars' participation and practices on twitter. *Journal of Computer Assisted Learning, 28*, 336–349.

Verma, A. (2018). Impact of social networking sites on adolescent students of Gangtok. *International Journal of Research in Humanities, Arts and Literature, 6*(4), 323–338.

Visser, R. D., Evering, L. C., & Barrett, D. E. (2014). Twitter for teachers: The implications of twitter as a self-directed professional development tool for K–12 teachers. *Journal of Research on Technology in Education, 46*(4), 396–413.

Voorn, R. J., & Kommers, P. A. (2013). Social media and higher education: Introversion and collaborative learning from the student's perspective. *International Journal of Social Media and Interactive Learning Environments, 1*(1), 59–73.

Vygotsky, L. (1978). Interaction between learning and development. *Readings on the Development of Children, 23*(3), 34–41.

Wankel, C. (2011) New dimensions of communicating with students: Introduction to teaching arts and science with the new social media, Wankel, C. (Ed.) *Teaching Arts and Science with the New Social Media* (*Cutting-Edge Technologies in Higher Education, Vol. 3*), Emerald Group publishing limited, Bingley, pp. 3-14. Available at: https://doi.org/10.1108/S2044-9968(2011)0000003004. (Accessed: 24 March 2020).

Wolfe, A.M. (2013) Students' attitudes towards social networks and learning modalities. *In Proceedings of the Marketing Management Association Spring Conference* (pp. 1221-1232).

Yamane, T. (1973). *Statistics - an introductory analysis* (3rd ed.). New York: Harper and Row.

Zhu, Z.-T., Yu, M.-H., & Riezebos, P. (2016). A research framework of smart education. *Smart Learning Environments, 3*(4), 1–17. https://doi.org/10.1186/s40561-016-0026-2.

Affiliations

Kwaku Anhwere Barfi[1] · Brandford Bervell[2] · Valentina Arkorful[2]

✉ Brandford Bervell
b.bervell@ucc.edu.gh

Kwaku Anhwere Barfi
kwaku.barfi@ucc.edu.gh

Valentina Arkorful
valentina.arkorful@ucc.edu.gh

[1] University Library, University of Cape Coast, Cape Coast, Ghana

[2] College of Distance Education, Maths, Science & ICT, University of Cape Coast, Cape Coast, Ghana

Terms and Conditions

Springer Nature journal content, brought to you courtesy of Springer Nature Customer Service Center GmbH ("Springer Nature").

Springer Nature supports a reasonable amount of sharing of research papers by authors, subscribers and authorised users ("Users"), for small-scale personal, non-commercial use provided that all copyright, trade and service marks and other proprietary notices are maintained. By accessing, sharing, receiving or otherwise using the Springer Nature journal content you agree to these terms of use ("Terms"). For these purposes, Springer Nature considers academic use (by researchers and students) to be non-commercial.

These Terms are supplementary and will apply in addition to any applicable website terms and conditions, a relevant site licence or a personal subscription. These Terms will prevail over any conflict or ambiguity with regards to the relevant terms, a site licence or a personal subscription (to the extent of the conflict or ambiguity only). For Creative Commons-licensed articles, the terms of the Creative Commons license used will apply.

We collect and use personal data to provide access to the Springer Nature journal content. We may also use these personal data internally within ResearchGate and Springer Nature and as agreed share it, in an anonymised way, for purposes of tracking, analysis and reporting. We will not otherwise disclose your personal data outside the ResearchGate or the Springer Nature group of companies unless we have your permission as detailed in the Privacy Policy.

While Users may use the Springer Nature journal content for small scale, personal non-commercial use, it is important to note that Users may not:

1. use such content for the purpose of providing other users with access on a regular or large scale basis or as a means to circumvent access control;
2. use such content where to do so would be considered a criminal or statutory offence in any jurisdiction, or gives rise to civil liability, or is otherwise unlawful;
3. falsely or misleadingly imply or suggest endorsement, approval , sponsorship, or association unless explicitly agreed to by Springer Nature in writing;
4. use bots or other automated methods to access the content or redirect messages
5. override any security feature or exclusionary protocol; or
6. share the content in order to create substitute for Springer Nature products or services or a systematic database of Springer Nature journal content.

In line with the restriction against commercial use, Springer Nature does not permit the creation of a product or service that creates revenue, royalties, rent or income from our content or its inclusion as part of a paid for service or for other commercial gain. Springer Nature journal content cannot be used for inter-library loans and librarians may not upload Springer Nature journal content on a large scale into their, or any other, institutional repository.

These terms of use are reviewed regularly and may be amended at any time. Springer Nature is not obligated to publish any information or content on this website and may remove it or features or functionality at our sole discretion, at any time with or without notice. Springer Nature may revoke this licence to you at any time and remove access to any copies of the Springer Nature journal content which have been saved.

To the fullest extent permitted by law, Springer Nature makes no warranties, representations or guarantees to Users, either express or implied with respect to the Springer nature journal content and all parties disclaim and waive any implied warranties or warranties imposed by law, including merchantability or fitness for any particular purpose.

Please note that these rights do not automatically extend to content, data or other material published by Springer Nature that may be licensed from third parties.

If you would like to use or distribute our Springer Nature journal content to a wider audience or on a regular basis or in any other manner not expressly permitted by these Terms, please contact Springer Nature at

onlineservice@springernature.com