

The Usage of Social Networking Sites by Medical Students for Educational Purposes: A Meta-analysis and Systematic Review

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Abstract

Background: Online social networking sites (SNSs) (e.g., Facebook, MySpace, Flickr, Twitter and YouTube) have emerged as rapidly growing mechanisms to exchange personal and professional information among university students. This research aims to determine the medical students' extent of usage of SNSs for educational purposes. **Materials and Methods:** Educational Resources Information Centre (ERIC), Cumulative Index of Nursing and Allied Health Literature (CINAHL), the Cochrane library, and Excerpta Medica Data Base (EMBASE) were searched to retrieve articles from 2004 to 2014, applying predefined search terms and inclusion criteria. The extracted 10 articles were outlined in a narrative synthesis of Quality, Utility, Extent, Strength, Target and Setting of the evidence (QUESTS). **Results:** Majority (75%) of the respondents admitted using SNSs, whereas 20% used these sites for sharing academic and educational information. No single study explored the impact of the SNSs on the academic performance. **Conclusion:** Understanding and knowledge of the significant use of SNSs by the medical students demand inclusion of such domains in medical curricula. This will train tomorrow's doctors in fostering their skills of digital technology for educational purposes.

Keywords: Facebook, LinkedIn, medical education, Myspace, social media, social networking sites, Twitter

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Introduction

The social networking sites (SNSs) are dedicated websites or applications that allow the clients to communicate with each other for sharing information, posting videos, pictures, comments, and messages.^[1] A wide spectrum of telecommunication gadgets are available for networking which are broadly classified in six categories, that is, blogs and microblogs (e.g., Twitter), collaborative projects (e.g., Wikipedia), content communities (e.g., YouTube), virtual social worlds (e.g., Second Life), virtual game worlds (e.g., World of Warcraft), and SNSs such as Facebook and MySpace.^[2] Google and Facebook

are the most commonly used social media tools, followed by YouTube, Twitter, Flickr, and LinkedIn.^[3] The usage of SNSs depends upon specific requirements of the clients. Precisely, if an academicians wants to supervise trainees' use of social media, Facebook, the most popular SNS, would be a logical choice.^[4] On the other hand, if a researcher or learner wishes to follow conversations in a particular discipline or contribute by sharing novel research information, one may consider Twitter, a popular microblogging SNS used by 15% of adults.^[5]

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Blogging is recommended for those who wish to further develop their writing skills. Engagement with social media can be personal, professional, or both, and there is ample evidence that digitally-savvy adults and youth use social media for health-related information.^[6]

Social media uses mobile and web-based technologies to create highly interactive digital platforms through which individuals and communities share, co-create, discuss, and modify their interactions. It facilitates pervasive and profound means of communication organizations, communities, and individuals.^[7] For this purpose, “Web 2.0” is often used interchangeably with “Social Media” or “user-generated content.”^[8] There is convincing evidence that SNSs are becoming popular among university students, specifically in connection with their studies.^[9] There are over 350 such SNSs in operation across the internet,^[10] however, there is a paucity of data in the adult literature describing their usage for educational purposes by medical students. This meta-analysis aims to test the hypothesis that “medical students use SNSs for educational purposes.” The results of the meta-analysis are then analyzed and conclusions are drawn to capture future recommendations.

Materials and Methods

The databases Medline, Educational Resources Information Centre (ERIC), Cumulative Index of Nursing and Allied Health Literature (CINAHL), the Cochrane library, and Excerpta Medica Data Base (EMBASE) were searched for articles about the usage of SNSs by medical students and the extent of usage of SNSs for educational purpose. The search included the period from 1 January 2004 to 1 January 2014. Data was retrieved by connecting Medical Subject Heading (MeSH) terms [“social media” or “social network” or “social networking” or “medical education” or “medical students” or “Facebook” or “Twitter” or “Web 2.0”] in Endnote X5 Software Philadelphia, PA.

Inclusion criteria were the selection of those articles where

- Respondents were medical and allied health (medicine, pharmacy, dentistry, nursing) students and/or of the undergraduate or postgraduate programs
- Usage of SNSs by students for educational purposes was explored
- Implementation of SNSs as an intervention in medical education was studied
- Studies included surveys or research-based projects.

Data were extracted, for each individual study, into a piloted, nonstandardized data-table for accuracy and completeness [Table 1]. Extraction included subheadings from the Best Evidence Medical Education (BEME) Quality, Utility, Extent, Strength, Target, Setting of evidence (QUESTS) acronym.^[11] The strength of the

retrieved evidence was graded using strength of evidence for BEME;^[12]

Grade 1; No clear conclusions can be drawn. Not significant

Grade 2; Results ambiguous, but there appears to be a trend

Grade 3; Conclusions can probably be based on the results

Grade 4; Results are clear and very likely to be true

Grade 5; Results are unequivocal.

The meta-analysis was conducted through Forest plot that graphically represents the consistency and reliability of the results from selected studies. In this study, Forest plot was designed through Microsoft Excel 2013 by following the recommended steps by Neyeloff, Fuchs.^[13] Effect size of each study was computed as an outcome, and pooled effect size was also calculated to observe the heterogeneity among studies. This search retrieved 1188 citations. Analysis of these studies was done by following the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).^[14] After analysis of abstracts and full-text articles, 1125 studies were excluded as they did not match the inclusion criteria either because these studies did not emphasize on social media literature or did not focus on SNSs usage in different health disciplines [Figure 1].

Sixty three studies were found relevant as they examined the usage of SNSs in medical education. During full-text analysis of these 63 studies, 3 more relevant studies were retrieved from cited research. From the aggregate of 66 studies, 56 were excluded due to theoretical and opinion-based contents, general studies on information

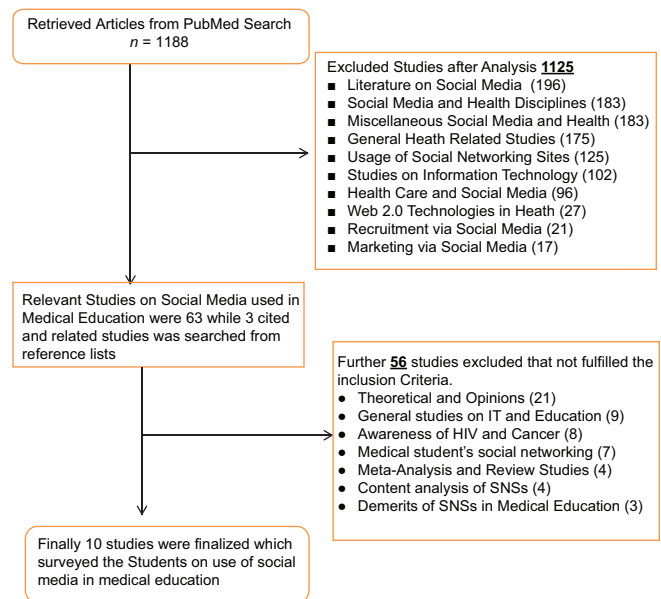


Figure 1: The flow diagram showing selection of articles for this systematic review and meta-analysis

Table 1: Narrative-analysis of selected articles by QUESTS about usage of social networking sites

Study	S-Setting, media, and participants	U-Utility of evidence	T-Target measure	Q-Quality of evidence	E-Extent of evidence (key results)	S-Strength of evidence
Gray <i>et al.</i> ^[9]	Australia Facebook Learning Medical students 1223; Respondents: 759 (62.1% response rate) Gender: 52.2% females and 47.8% males	As study was institution based and had low response rate, external validity is limited	Level 1: Survey	BEME level 4; Mixed Methods; Non-standardized, Observational, descriptive case study (n=759). Thematic analysis. No control group	Learner satisfaction: 1. 25.5% of students reported using Facebook for education related purposes 2. Four case studies showed conservative approaches in students' efforts to support their development of medical knowledge, skills, and attributes in this manner Others The majority of students had used Facebook (87.0%). Most accessed it weekly or more often (90.5%), and over half (55.2%) daily Learner satisfaction: 1. Respondents claimed that they were interested in using Web 2.0 technologies for education, but there was lack of knowledge and skills on how to use these new technologies 2. 60% respondents in all groups claimed that podcasts were of no use in professional development, but approximately 10% regarded them as being very or extremely useful 3. Majority (79.8%) of the medical students were owners whereas half of the consultants, general practitioners, and doctors in training owned an MP3 or digital media player Engaging with social-networking: 4. Students were more familiar with the terms instant messaging, blogs, and social networking as compared to consultants, general practitioners, and doctors	Descriptive analysis and thematic analysis
Sanders and Schroter ^[15]	UK Web 2.0 technologies Mixed learning 6000 participants: 3000 medical students (graduate and postgraduate) and 3000 qualified Medical practitioners Response rate: 1239 (21%, 637 medical students and 601 medical doctors) Gender: Majority males 664 (53.59%) and 575 (46.01%) females Age (SD): Students 24.4 (5.5) and qualified medical practitioners age (37.8 to 48.3) and SD (8.3 to 11.1)	Limited external validity as response rate is very low	Level 1: Survey	BEME level 4; Mixed Methods Nonstandardized, Observational, descriptive case study (n=1239). Content analysis. No control group		Grade 3: Descriptive analysis and general comments on open ended questions

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Study	S-Setting, media, and participants	U-Utility of evidence	T-Target measure	Q-Quality of evidence	E-Extent of evidence (key results)	S-Strength of evidence
DiVall and Kirwin ^[21]	USA Facebook Mixed learning 133 undergraduate pharmacy students 119 (97%) actively participated in survey	As study was specifically course based so external validity is limited	Level 1: Survey and Focus Group. Level 2: Examination results	BEME level 4; Observational, descriptive case study (n=133), Nonstandardized, anonymous, survey (n=119) and focus group (n=3). Quasi-experimental control group	Learner satisfaction: 1. 26% students found Facebook use in the course beneficial for them as compared to class 2. 57% indicated that they would miss Facebook if it was not used in their remaining courses Engaging with social-networking: 3. First impression when they learned about the Facebook course page, only 11% were excited 4. 82% students viewed Facebook posts either in their news feed or by visiting the course page 5. Only 26% of students contributed posts or comments by interacting on the Facebook course page Other 6. 61% students strongly agreed or agreed that they were more likely to post on Facebook than Blackboard 7. 77% strongly agreed that they were more likely to see and read posts on Facebook than on Blackboard	Grade 3: Descriptive analysis. No statistical analysis
Hall <i>et al.</i> ^[22]	UK Facebook Pure Distance Learning 659 undergraduate Pharmacy students while response rate 66.2% (377 students). Majority female students 265 (70.3%), 4 th year students had highest participation 129 (34.2%)	Limited external validity as study was University course based	Level 1: Survey	BEME level 4; Observational, descriptive case study (n=659). i) Non-standardized, piloted (n=10), anonymous, survey (n=377). ii) Analytical, inferential results. No control group	Learner satisfaction: 1. Majority (98%) claimed that their main purpose for using the sites was personal, while only 1.7% used them for educational and 0.3% for professional purposes. 2. 76.5% students strongly agreed or agreed that they had used social networking sites to discuss academic-related problems Engaging with social-networking: 3. Majority 83.8% spent less than 2 hours per day using social networking Web sites Other 4. 87.5% male respondents, used social networking sites, compared with 93.6% of female respondents (p50.049) Male students who used social networking sites were also significantly more likely to use them for educational purpose. 5. 2 nd year students had used social networking Web sites most to discuss academic-related problems, with 88.6% strongly agreeing or agreeing, compared with 81.7% of 3 rd year students, 67.9% of 4 th year students, and 73.3% of 1 st year students	Grade 3: Statistical analysis (Mann-Whitney, Kruskal-Wallis, and Chi-square tests) was performed

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Study	S-Setting, media, and participants	U-Utility of evidence	T-Target measure	Q-Quality of evidence	E-Extent of evidence (key results)	S-Strength of evidence
White <i>et al.</i> ^[16]	Canada Facebook Mixed learning 3984 participants: Students of medicine, nursing, pharmacy, speech and language pathology, occupational therapy, physical therapy, dentistry, dental hygiene, and medical laboratory Science Response rate: 17% as only 682 students responded to the survey (highest 33% from Medicine students) Gender: Female:male ratio was 3:1	As study was specifically institutional based with low response rate, external validity is limited	Level 1: Semi structured interviews and online survey	BEME level 4; Mixed Methods Observational, descriptive case study (n=682). Nonstandardized, interviews (n=14) and online survey (n=682). Thematic analysis. No control group	Learner satisfaction: 1. Majority of participants agreed that guidelines for Facebook use would be beneficial 2. 44% students claimed that they saw material posted by a colleague 3. 27% reported posting such material themselves Engaging with social networking: 4. 90% respondents used Facebook 5. Majority 76% respondents checked their account at least two times per day 6. In friend list, majority 96% are other students 7. 99% respondents agreed that it would be unprofessional to post images or text which could be used to identify a patient	Grade 3: Descriptive analysis only
Roblyer <i>et al.</i> ^[17]	USA Facebook Blended learning 270 participants; 182 respondents (120 students and 62 faculty members) Gender: Majority Females 53.3% (n=120) students while 51.6% (n=62) from Faculty Ethnicity: Caucasian were in majority 62.9% (n=120) students and 90.2% (n=62)	As study was specifically institutional base so external validity is limited	Level 1: Survey	BEME level 4; Observational, descriptive case study (n=182). Nonstandardized, observational descriptive study, anonymous, survey (n=128). Analytical, inferential results. No control group	Learner satisfaction: 1. Overall Only 9 respondents use Facebook for academic purpose 2. Faculty 33% agreed that Facebook is personal usage not for educational 3. Faculty was significantly more likely to agree that "Facebook is not for education" Engaging with social-networking: 4. Students are much more likely than faculty to use Facebook and are significantly more open to the possibility of using Facebook and similar technologies to support classroom work 5. Faculty members are more likely to use more "traditional" technologies such as email	Grade 3: Statistical analysis (Mann-Whitney U test, and Chi-square tests) was performed
Mena <i>et al.</i> ^[18]	Spain Facebook Blended learning 538 participants; undergraduate students from 1 st year (preclinical) and 2 nd year (clinical) Response rate: 410 (76.2%) students Gender: Majority (74.%) females Age: 20.4 years (range 17-35; 95% CI 18.1-22.7)	As study was specifically institutional base, so external validity is limited	Level 1: Survey	BEME level 4; Observational, descriptive case study (n=410). Nonstandardized, observational descriptive study, anonymous, survey (n=410) No control group	Learner satisfaction: 1. 65.1% participants reported using the Internet for queries on influenza vaccination and technical Facebook group Engaging with social-networking: 2. 89.8% reported that they were Facebook users 3. 275 (67.1%) would accept an invitation from the technical or informal Facebook pages. The technical Web site was actively followed by 77 (30%) students	Grade 3: Descriptive analysis only

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Study	S-Setting, media, and participants	U-Utility of evidence	T-Target measure	Q-Quality of evidence	E-Extent of evidence (key results)	S-Strength of evidence
Erfanian <i>et al.</i> ^[9]	Iran Social Networking Sites (SNSs) Blended learning 400 participants; Medicine (89), nursing (75), health (80) and Paraclinic (152) students Response rate: 38.25% (153 students) Gender: Majority Females 66.6% Age: Majority 67.3% belong to 19-23 years category	As study was specifically institutional base so external validity is limited	Level 1: Survey	BEME level 4; Observational, descriptive case study (n=153). i) Nonstandardized, anonymous, survey (n=153). No control group	Learner satisfaction: 1. Only 11% respondents used SNSs for education Engaging with social-networking: 1. 57.5% respondents were knowledgeable about SNSs 2. Majority 55% used SNSs for communication with old friends	Grade 3: Descriptive statistics only
Cain and Policastro ^[20]	USA Facebook Mixed learning 128 undergraduate pharmacy students, 100 (78%) have Facebook account 74 (58%) were female, 114 (89%) Caucasian average age: 24	As study was specifically course based, so limited external validity is limited	Level 1: Survey and Focus Group. Level 2: Examination results	BEME level 4; Mixed Methods Observational, descriptive case study (n=100). Nonstandardized, piloted, anonymous, survey (n=128) and focus group (n=5). Analytical, inferential results. Quasi-experimental control group	Learner satisfaction: 1. 84% students stated main reason was to gain extra credit in exam. Whereas other (16%) students pinpointed various learning perspectives 2. 13% (n=13) of participants stated that activity was very valuable, 64% indicated it was somewhat valuable, while remaining 23% were neutral with regard to its value 3. Survey and focus-group highlighted positivity regarding uniqueness of the project Engaging with social-networking: 4. 52% (n=52) read 25% or less of the posts While 25% (n=25) read almost 75% or more of the posts Other: 5. An independent t-test revealed a significant increase in exam scores in participants who were engaged with the Facebook group 6. Focus group revealed that it was paramount that the activity was optional to maintain students' interest in the activity	Grade 3: Statistically significant increase in examination scores in Facebook participants (independent t-test) compared to nonparticipants

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Table 1: Contd...

Study	S-Setting, media, and participants	U-Utility of evidence	T-Target measure	Q-Quality of evidence	E-Extent of evidence (key results)	S-Strength of evidence
Adithya <i>et al.</i> ^[23]	India SNSs (Facebook, YouTube, LinkedIn etc.) Blended learning 150 participants; majority 62.3% female dental students Response rate: 122 students (81.33%)	As study was specifically institutional base, so external validity is limited	Level 1: Survey	BEME level 4; Observational, descriptive case study (n=122). No control group	Learner satisfaction: 1. 67 (54.92%) students argued that SNSs helped in study and learning purposes 2. Majority (93) (76.23%) got information about SNSs from guidance of their friends Engaging with social-networking: 1. Majority (87) (71.31%) students used Facebook. 2. 65 (53.28%) respondents had more than two years of experience in using SNSs 3. Only 22 (18.03%) students argued that use of SNSs have affected their academic performance Other 4. 39 (32%) students visited the SNSs daily. 5. 61 (50%) students have above 100 friends on their SNSs 6. 80 (65.57%) students spent less than 1 hour in using SNSs	Grade 3: Descriptive only. No Statistical analysis was performed

BEME = Best Evidence Medical Education, SNSs = Social networking sites, QUESTIS = Quality, Utility, Extent, Strength, Target and Setting of the evidence

technology and education, and meta-analysis, and review studies. The finally selected 10 articles were analyzed in detail.

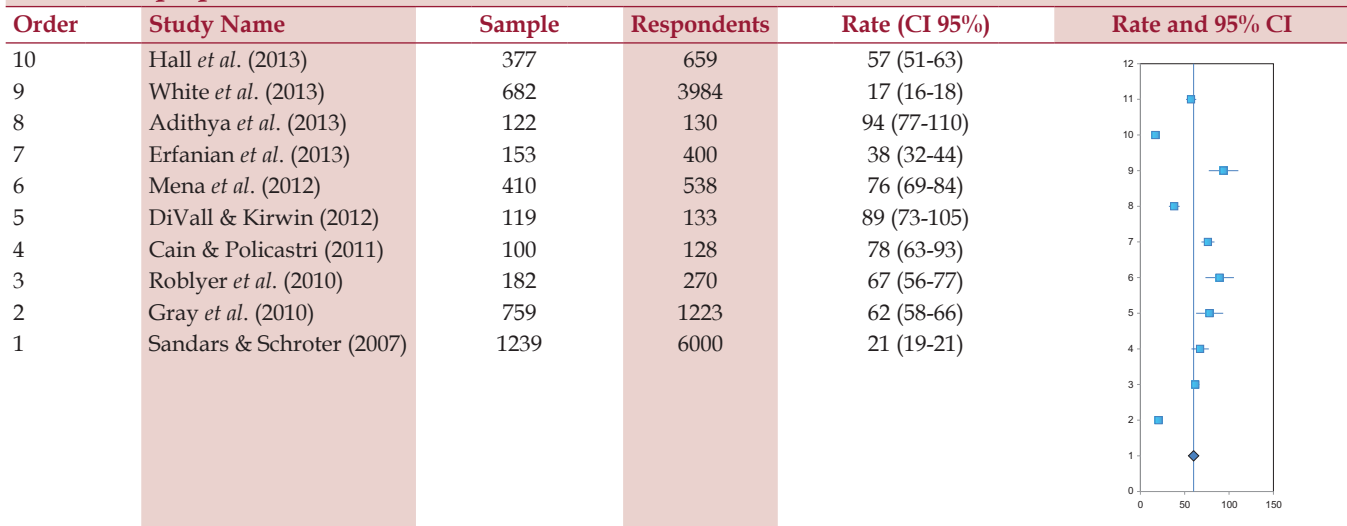
Results

Overall, 75% (70–80%) of the respondents in this meta-analysis used SNSs, whereas 20% (1.7–54%) reported that they used SNSs for academic and educational purposes. No single study has performed the scientific analysis to examine the educational impact of the SNSs on the medical and allied health sciences students. Only two studies have applied inferential statistics whereas rest of the studies have presented descriptive statistics only. Figure 2 shows the Forest plot that illustrates a series of estimates and their confidence intervals at 95% level.

Each individual study’s effect size (outcome) is shown by a square box and the confidence interval is represented through a horizontal line. This plot shows that the selected studies have wider confidence intervals with inconsistent response rates, indicating heterogeneity. On the basis of greater heterogeneity, random effects model is the appropriate effect summary model of this study. Therefore, effect summary 60.06% with confidence interval (49–71%) is the relative point to compare the effect sizes of all studies. The 10 studied articles are briefed in Table 1.

Gray *et al.*^[9] explored the productive usage of SNSs (Facebook) by Australian medical students. They applied both quantitative and qualitative methods, and empirically, found that 25.5% of 759 respondents used Facebook for educational purposes. Sandars and Schroter^[15] assessed the level of awareness and usage of Web 2.0 technologies (podcasts) by qualified medical practitioners and medical students in the UK. They found that respondents had greater understanding of different Web 2.0 technologies and they were eager to apply these technologies in medical education. Unfortunately, the respondents were unable to properly utilize them without training. The authors stressed the need to train the students in getting better results. White *et al.*^[16] investigated the usage of SNSs by medical students in Canada. The majority of respondents agreed that Facebook might be beneficial if its usage follows appropriate guidelines for maintaining privacy, legal, and social concerns. Roblyer *et al.*^[17] conducted a comparative overview of usage and purposes of SNSs by faculty and medical students in USA. The study concluded that only 9 (4.9%) respondents used Facebook and other social media for academic purposes and communication. Sixty (33%) of the respondents agreed that Facebook was for social and personal usage but “not for education.” However, majority (69; 37.9%) of the respondents agreed that it would be very convenient to

Figure 2: The Forest plot analysis illustrating the usage of social networking sites by medical students for educational purposes



use Facebook for education. The students preferred SNSs technologies for study and class work projects whereas faculty still used traditional modes such as email. Mena *et al.*^[18] studied the eagerness of health professionals and medical students regarding the usage of SNSs for shaping their professional behavior in Spain. They found that 65.1% health professionals searched influenza vaccination queries on internet, and joined and actively participated in technical Facebook group. They claimed that students were more willing to join and participate in informal Facebook pages.

Erfanian *et al.*^[19] explored the knowledge and usage of SNSs of medical students from different fields including Medicine, Nursing, Health, and Paraclinic in Iran. They found that 57.5% medical students were aware about SNSs. However, more than half (55%) used SNSs for getting in touch with their old friends whereas only 11% students used SNSs for educational purposes. They suggested that there was a need to improve the cultural and educational quality of SNSs for producing optimal outcome. Cain and PolICASTRI^[20] studied the informal application of SNSs among undergraduate pharmacy students in USA. They developed a unique learning environment to provide exposure to students regarding contemporary issues and perspectives of 3 external experts in their field by creating a Facebook group page with optional participation. The majority (84%) stated that their main reason of joining the group was to gain extra credit in exam. On the other hand, 16% highlighted various learning perspectives and priorities to join the group. Majority (64%) of the group members indicated this activity as somewhat valuable, 13% very valuable, whereas 23% remained neutral. This study concluded that group members' exam scores were significantly higher as compared to nongroup members.

DiVall and Kirwin^[21] studied the usefulness of SNSs for undergraduate pharmacy course-related discussion in USA via a Facebook page. Students actively participated in online discussion on Facebook as well as in survey with a response rate of 97%. The students contributed significantly in online discussion through posts and comments, with a contribution rate of 26%. Majority (86%) of the students found Facebook usage in their course extremely beneficial for learning perspectives. Fifty seven percent strongly recommended the continuity of Facebook application in upcoming courses due to its productivity and more learning opportunities.

Hall *et al.*^[22] investigated the application and perspective of pharmacy students regarding SNSs in the UK. Among the respondents (377/659), 98% stated that they used SNSs for their personal matters, and few (1.7%) of them used SNSs for academic purposes. Seventy five percent agreed that they frequently used SNSs for discussing academic problems. The authors suggested that students require special training to familiarize them regarding how to effectively apply codes of conduct while using SNSs. Adithya *et al.*^[23] explored the usage of SNSs among students in India. The authors claimed that students most frequently used SNSs for information and getting in touch with friends. They found that 67 (54.92%) students suggested the usage of SNSs being beneficial to their studies and learning needs and 22% (18.03%) students stated that SNSs usage had a positive impact on their academic performance.

Discussion

Modern tools and technologies such as blogs and microblogs, folksonomies, RSS feeds, wikis, media-sharing applications, networking sites, or other social artifacts are

being used with great potential in various capacities and disciplines for commercial, social, and educational purposes. As of today, the Internet has reached near ubiquity,^[24] and the standard on which the Internet is now based is known as “Web 2.0”: Web applications that allow end-users to interact and collaborate as content creators, rather than -one-directional information on relatively static “Web 1.0” websites of pre-2004 era.^[25] Web 2.0 technologies have been classified by their main functionalities, that is, online reflection, social spaces, online collaboration, social bookmarking, and repository.^[15] When applied to medical education, social media seems to help both medical educators/doctors, physicians, librarians, and students to utilize the Web 2.0 enterprise, enhancing their teaching-learning experiences through customization and personalization in a rich environment of networking and collaboration.^[26] The results of the current meta-analysis report a significant (75%) use of SNSs by the medical and allied health students. However, 20% students use SNSs for educational purposes (random effects model; 60.06%) with 95% CI of 49–71%. This report might encourage the medical educators and administrators to incorporate the usage of social media technology in various instructional and teaching/learning strategies. Embedding the state-of-the-art digital technologies in medical curricula will be at par with the medical students’ learning styles^[27] that has the potential to foster learning at workplace.^[28]

The advantages of using SNSs for educational purpose are far ranging. A study reported that the use of social media tools augmented students’ learning opportunities, allowed for real-time communication outside the classroom, helped students connect with medical experts, fostered collaborative opportunities, and enhanced creativity.^[29] Learners can watch educationally relevant videos or exchange information about what they have watched and learned, and then join online to further discuss with tutors. Even the tutors can learn from the students during social media interactions. Likewise, a tutor can supervise students while they are learning, interacting, sharing, reflecting, and summarizing discussions. SNSs provide a forum to contact peers and teachers from wherever they are, offering the flexibility of “extended duty hours.” Some social sites’, especially Facebook, features may encourage students to engage in creative and social learning processes that extend beyond traditional educational settings and institutions.^[30] This provides added benefit to access wide and diverse sources of information and opportunities for communication.^[31]

Selwyn has rightly commented that the use of social media in higher education is driven by three concepts, that are, the changing learning environment of the

student coming to the university as highly connected, collective, and creative subject; the changing relationship that today’s university student develops in terms of knowledge consumption and knowledge construction; and de-emphasis of institutionally provided learning due to the emergence of “user-driven” education.^[32] King *et al.* developed an interprofessional team course in the healthcare field by integrating social networking teaching strategy.^[33] Investigators reported that the integration of an educationally structured social networking environment facilitated growth toward the concept of effective communication. A study has reported that almost all US medical schools have a Facebook presence, however, the majority does not know the bylaws addressing student online social networking policies and control.^[34]

While the use of social media escalates, policies regarding the appropriate conduct in medical schools need to be applied. Established policies at some medical schools can provide a blueprint for other institutions. The educators and administrators of the medical schools are urged to develop policies to define the balance between the forbidden and appropriate social media behaviors that can help students navigate their online interactions.^[29] Nevertheless, the application of a social media policy alone cannot prevent unprofessional networking behavior by students,^[35] and there is a strong urge to enforce the fundamental principles of ethics in medical fraternity.^[36]

Paul and Baker have shown that the time spent on SNSs by the medical students can negatively influence students’ academic achievement.^[37] In their structural equation model, authors reported a small, but significant, negative relationship ($r = -0.119$, $P = 0.048$) between time spent on an SNS and academic performance as measured by course grades and cumulative grade point average (GPA). Others found a negative relationship between Facebook use and GPA as the quantitative analysis of their study showed that there were mean differences between the GPAs of users ($M = 3.06$) and nonusers ($M = 3.82$).^[38] However, Pasek *et al.* could not find a negative correlation between Facebook use and GPA in a sample of students from a public research university.^[39]

Social networking is not without problems. Integrity and privacy are purported to be the two major concerns regarding the use of SNSs.^[40] The social communication paradigm is transforming the traditional face-to-face or telephone model to one that depends on a range of Web-based social media applications. These technologies have proliferated to the extent that can disrupt the delicate elements of our social fabric.^[41] Institutions need

to stay abreast with the knowledge and understanding of the evolving landscape of legal and ethical issues about the unethical use of SNSs. Ethics, privacy, and code of conduct are important issues to be considered while advocating the legal applications of SNSs.

Conclusion

In this meta-analysis, majority (70–80%) of the respondents used SNSs for social communications, however, 20% (1.7–54%) used SNSs for sharing academic and educational information. No single study has explored the impact of the SNSs on the academic performance of the students. Only two studies have applied inferential statistics whereas rest of the studies have presented descriptive statistics only. Authors have not reported the reliability and validity of their instruments, which might need to be considered in future studies. Social media are changing the face of medical field. The results of this meta-analysis emphasize the need to inculcate various modalities of SNSs in the teaching and learning strategies of the medical curricula. At the same time, students and faculty need to be more acquainted and well-trained to get the maximum benefits of SNSs.

Recommendations

- Significant usage of SNSs implies that this platform can be used for better educational impact by modifying the instructional strategies and curricula of the medical schools
- The details of how the students use SNSs for educational purpose should be explored
- The reliability and validity of the instrument applied for the collection of information must be checked prior to its analysis
- The upcoming studies might formulate the hypothesis “Do social networking sites promote medical education,” and might test this hypothesis through regression and correlation analysis.

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Conflicts of interest

There are no conflicts of interest.

References

1. Cartledge P, Miller M, Phillips B. The use of social-networking sites in medical education. *Med Teach* 2013;35:847-57.
2. Kaplan AM, Haenlein M. Users of the world, unite! The challenges and opportunities of Social Media. *Bus Horiz* 2010;53:59-68.
3. Alexa. The top 500 sites in the world. 2015. (Accessed October 23, 2016, at: <http://www.alexa.com/topsites>).
4. Brenner J, Smith A. 72% of online adults are social networking site users. Washington, DC: Pew Internet & American Life Project; 2013.
5. Lin MF, Hoffman ES, Borengasser C. Is Social Media Too Social for Class? A Case Study of Twitter Use. *Tech Trends* 2013;57:39-45.
6. Greene JA, Choudhry NK, Kilabuk E, Shrank WH. Online social networking by patients with diabetes: A qualitative evaluation of communication with Facebook. *J Gen Inter Med* 2011;26:287-92.
7. Kietzmann JH, Hermkens K, McCarthy IP, Silvestre BS. Social media? Get serious! Understanding the functional building blocks of social media. *Bus Horiz* 2011;54:241-51.
8. Segerberg A, Bennett WL. Social media and the organization of collective action: Using Twitter to explore the ecologies of two climate change protests. *Comm Rev* 2011;14:197-215.
9. Gray K, Annabell L, Kennedy G. Medical students' use of Facebook to support learning: Insights from four case studies. *Med Teach* 2010;32:971-6.
10. Farmer A, Holt CB, Cook M, Hearing S. Social networking sites: A novel portal for communication. *Postgrad Med J* 2009;85:455-9.
11. Harden RM, Grant J, Buckley G, Hart IR. BEME Guide No. 1: Best evidence medical education. *Med Teach* 1999;21:553-62.
12. Hammick M. Interprofessional education: Evidence from the past to guide the future. *Med Teach* 2000;22:461-7.
13. Neyeloff JL, Fuchs SC, Moreira LB. Meta-analyses and Forest plots using a microsoft excel spreadsheet: Step-by-step guide focusing on descriptive data analysis. *BMC Res No* 2012;5:52.
14. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Ann Intern Med* 2009;151:264-9.
15. Sandars J, Schroter S. Web 2.0 technologies for undergraduate and postgraduate medical education: An online survey. *Postgrad Med J* 2007;83:759-62.
16. White J, Kirwan P, Lai K, Walton J, Ross S. 'Have you seen what is on Facebook?' The use of social networking software by healthcare professions students. *BMJ Open* 2013;3.
17. Roblyer M, McDaniel M, Webb M, Herman J, Witty JV. Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *Inter High Edu* 2010;13:134-40.
18. Mena G, Llupià A, García-Basteiro AL, Aldea M, Sequera VG, Trilla A. The willingness of medical students to use facebook as a training channel for professional habits: The case of influenza vaccination. *Cyber Beha Soc Net* 2012;15:328-31.
19. Erfanian M, Javadinia SA, Abedini M, Bijari B. Iranian Students and Social Networking Sites: Prevalence and Pattern of Usage. *Pro-Soc Behav Sci* 2013;83:44-6.
20. Cain J, Policastro A. Using Facebook as an informal learning environment. *Am J Pharm Educ* 2011;75.
21. DiVall MV, Kirwin JL. Using Facebook to facilitate

- course-related discussion between students and faculty members. *Am J Pharm Educ* 2012;76.
22. Hall M, Hanna L-A, Huey G. Use and Views on Social Networking Sites of Pharmacy Students in the United Kingdom. *Am J Pharm Educ* 2013;77.
 23. Adithya KH, Ali K, Mahadevamurthy M. Use of Social Media among Dental Students of Farooqia Dental College, Mysore: A Study. *International Conference on Open Access - Scholarly Communication Reincarnated: A Futuristic Approach: Bangalore University; 2013.*
 24. Bennett GG, Glasgow RE. The delivery of public health interventions via the Internet: Actualizing their potential. *Annu Rev Public Health* 2009;30:273-92.
 25. Gold J, Pedrana AE, Stooove MA, Chang S, Howard S, Asselin J, *et al.* Developing health promotion interventions on social networking sites: Recommendations from The FaceSpace Project. *Med Inter Res* 2012;14:e30.
 26. Popoiu MC, Grosseck G, Holotescu C. What do we know about the use of social media in medical education? *Pro-Soc Behav Sci* 2012;46:2262-6.
 27. Guraya SS, Guraya SY, Habib FA, Khoshhal KI. Learning styles of medical students at Taibah University: Trends and implications. *Res Med Sci* 2014;19:1155.
 28. Guraya SY. Workplace-based assessment; applications and educational impact. *Mala J Med Sci* 2015;22:5-10.
 29. George DR, Dellasega C. Use of social media in graduate-level medical humanities education: Two pilot studies from Penn State College of Medicine. *Med Teach* 2011;33:e429-e34.
 30. Wiberg M. Netlearning and learning through networks. *Edu Tech Soc* 2007;10:49-61.
 31. Dron J, Anderson T, editors. *Collectives, networks and groups in social software for e-Learning. World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education; 2007.*
 32. Selwyn N. Looking beyond learning: Notes towards the critical study of educational technology. *J Com Assis Lea* 2010;26:65-73.
 33. King S, Greidanus E, Carbonaro M, Drummond J, Patterson S. Merging social networking environments and formal learning environments to support and facilitate interprofessional instruction. *Med Edu On* 2009;14.
 34. Kind T, Genrich G, Sodhi A, Chretien KC. Social media policies at US medical schools. *Med Edu On* 2010;15.
 35. Benetoli A, Chen TF, Aslani P. The use of social media in pharmacy practice and education. *Res Soc Admin Phar* 2014;11:1-46.
 36. Guraya SY, London N, Guraya SS. Ethics in medical research. *Micro Ultra* 2014;2:121-6.
 37. Paul JA, Baker HM, Cochran JD. Effect of online social networking on student academic performance. *Comp Hum Behav* 2012;28:2117-27.
 38. Kirschner PA, Karpinski AC. Facebook® and academic performance. *Comp Hum Behav* 2010;26:1237-45.
 39. Pasek J, Hargittai E. Facebook and academic performance: Reconciling a media sensation with data. *Fir Mon* 2009;14.
 40. O’Keeffe GS, Clarke-Pearson K. The impact of social media on children, adolescents, and families. *Pediatrics* 2011;127:800-4.
 41. Cain J, Fink JL. Legal and ethical issues regarding social media and pharmacy education. *Am J Pharm Educ* 2010;74:184.