

Does Social Media Use Increase or Decrease Learning Performance?

A Meta-Analysis Based on International English Journal Studies

Park, Ki-ho* · Ren Gaufei**

〈목 차〉

I. Introduction	4.2 Literature Search
II. Literature Review	4.3 Literature Coding
2.1 Social Media Use	V. Data Analysis
2.2 Positive Effect of Social Media Use on Learning Performance	5.1 Effect Size Heterogeneity and Main Effect Test
2.3 Negative Effect of Social Media Use on Learning Performance	5.2 Moderating Effect Test
III. Hypotheses Development and Research Model	VI. Discussion and Conclusions
IV. Research Method and Literature Search	References
4.1 Research Method	<Abstract>

I. Introduction

According to the rapid development of digital technology based on web2.0, the current learning environment has undergone great changes. Social media can promote the exchange and sharing of ideas, knowledge and

information through social networks and virtual communities(Nielsen, 2017). With the ease of use of network tools and the explosion of social media, social media users through the Internet, using computer or mobile device (e.g., smart phone or tablet) applications (Shepherd and Freiwald, 2018) can undertake professional

* Management of Digital Technology, College of Administration, Hoseo University, khpark@hoseo.edu, (corresponding author)

** Management of Digital Technology, Hoseo University

self-directed learning initiative, social media generally affects young people's daily life, especially college students (Stathopoulou et al., 2019). Social media has changed the way college students communicate, interact and socialize in the learning process of educational institutions (Terzi and Kaya, 2019). This new form of media plays a crucial role in content sharing between college students and the public. Students can participate in social discussions by sharing pictures, commenting and spreading ideas. Digital media and social networks are revolutionizing the way we communicate, collaborate, share and consume information on a daily basis (Tulin et al., 2018).

Mixed teaching based on social media, as a generalized teaching method, is on the rise in education. Researches concerning the impact of social media use on learning performance have attracted great attention from scholars, but there are still differences in the strength, direction and significance of the relationship between social media use and learning performance. Those differences are growing as the number of studies on social media, information overload and more concerns about social media. Therefore, the analysis of the relationship between them has great theoretical value in promoting the study of the use of social media. At present, abundant empirical research results have been accumulated in the research field of social media and learning performance, which provides substantial

literature for the meta-analysis of the relationship between social media use and learning performance. Based on these situation, this paper will make a meta-analysis of the relationship between the social media use and learning performance as well as its potential moderating variables, so as to clarify the differences in research conclusions in existing literatures, and refine the situational and method factors that affect the relationship between them, so as to provide new ideas and directions for the study on the performance of the use of social media.

II. Literature Review

2.1 Social Media Use

Ressler and Glazer (2011) defined social media as “a set of internet-based tools that can help users connect, collaborate and communicate with others in real time”. As Milton (2014) pointed out that social media is interwoven with ever-changing contact patterns, in which people send and receive information in various ways and create meaning together in the context. Some scholars try to define social media, but the description of social media to make the most from Kaplan and Heinlein (2010), social media they would be described as collections of Internet tools and applications, these tools and applications

are usually based on Web 2.0, authorized to create, share, and trading of user-generated content or site generated by social media user data. Under the proliferation of social media users, many scholars began to devote themselves to the study of the use of social networks and social media, involving fields including security privacy (Mohamed and Ahmad, 2012), psychology (Wang et al., 2012), marketing (Fuciu and Groski, 2013), culture (Alomoush et al., 2012), society (Lee, 2013), etc. In recent years, there are more and more researches that use social media as an effective learning tool and actively explore collaborative learning to improve students' learning performance and self-efficacy(김정은 등, 2016). However, most researches only study a specific social media tool, such as Facebook, Myspace and Twitter.

For the analysis of the use behavior of social media users, the Technology Acceptance Model (TAM) includes the main variables that can explain the Acceptance of Technology (Goode and Harris, 2007; King and He, 2006; Lee et al., 2003; Venkatesh and Davis, 2000). It was originally developed by Davis (1989) et al., to explain the reasons for the adoption or rejection of computer technology, including such factors as attitude, perceived usefulness and perceived ease of use. Attitude refers to the tendency to make positive or negative reactions to certain things (Fishbein and Ajzen, 1975). Perceived usefulness refers to the

degree to which an individual perceives that the use of a particular system will affect his work performance, while perceived ease of use refers to the degree to which an individual thinks that the use of a particular system does not require too much effort. Social media presents a large number of experiences from a psychological perspective, each of which may lead to problematic behavior patterns. For example, a socially inclined person might spend a lot of time on Facebook, WeChat and other social media, repeatedly checking their profile to see how many "likes" their latest post has received. Others with narcissistic tendencies may find that Instagram is an addictive platform for them to express their dissatisfaction with others by "taking selfies" (Balakrishnan, 2016). Another trigger for social media addiction may be social anxiety, and the fear of missing out provides an explanation for frequent daily use of social media at the expense of other activities (Przybylski et al., 2013). Social media can enhance students' creativity and stimulate their interest in learning, and it is easier for students to communicate with teachers through social media. Junco (2011), Gregory (2014) et al. showed that the use of Twitter and Facebook could improve the learning participation and performance of college students. Therefore, researchers present two different views on the impact of social media use on learning performance: positive or negative.

2.2 Positive Effect of Social Media Use on Learning Performance

Social media is an online tool that provides great advantages for better results and experiences through cognitive engagement and social interaction (Lockyer and Patterson, 2008). At present, social media has become a popular e-learning platform, which can be used for knowledge sharing and active collaborative learning (Rau, 2008). It can also be used to create virtual classrooms that provide positive relationship, communication and entertainment for students(김중기 등, 2012; Blattner and Fiori, 2009), promote and exercise students' creativity and communication skills (Kabilan et al., 2010). Some specific educational experiments include the use of Twitter in university classrooms (Tur et al., 2017) to assess the presence and acceptance of digital learning among medical undergraduates. Research shows that the use of social media can bring positive learning results and participation experience (McCarthy, 2010; Junco et al., 2011). Al-rahmi et al. (2018) used constructivism theory and technology acceptance model as the main data collection method to conduct a questionnaire survey on social media learning among 723 graduate students from five research universities in Malaysia. Research shows that comprehensive and active collaborative learning and participation through social media can enrich

students' learning activities and promote group discussion (Al-Rahmi, 2018). Research by Prestridge (2019) shows that teachers also acknowledge that they learn through social media as valuable, informal, and self-directed, and that social media provides options that have a positive impact on their classroom practice.

Social media use has a positive impact on students' academic performance and satisfaction (Cao and Hong, 2011). In education, the use of social media enhances students' active collaborative learning (Ractham and Firpo, 2011; Liao, Huang, Chen and Huang, 2015). In the study of Jung et al. (2002), undergraduates who participated in online collaborative tasks were more satisfied with their learning than those who did not. In particular, Selwyn and Grant (2009) and Arnold and Paulus (2010) emphasized the potential of this collaborative learning approach. Meanwhile, al-rahmi et Al. (2015) and Karpinski et Al. (2013) also found that the use of social media in education could improve students' academic performance and learning environment. By creating a classroom community that manages information and knowledge sharing between them, students can effectively participate in improving their grades. Ainin et al. (2015) confirmed this when they found a positive relationship between students' academic performance and the use of Facebook. Social media can also be integrated

into problem-based Learning (PBL), which can promote the participation and feedback of learners, promote teamwork and professional development, and improve the communication and knowledge level between medical professionals and students (Sharma, 2014; Barberet al., 2015).

Learning anywhere and anytime is an important reason to use social media. One possible way to use Facebook for teaching is to use its groups as a Learning Management System (LMS). The use of LMS has many benefits for teaching, enabling teachers to shift emphasis from content-based learning to process-based learning (Vogel and Klassen, 2001) and helping to facilitate the transition of students from passive to active learning (Herse and Lee, 2005). Woo (2011) discusses how to use Facebook groups as a learning management system and surveys students' opinions based on their experience. The study's findings confirm that Facebook groups can replace LMS. In schools that do not offer commercial LMSs, Facebook can act as a fully functional LMS. At other schools that already use commercial LMSs, Facebook can be used for extracurricular activities to complement social interaction and personal space.

2.3 Negative Effect of Social Media Use on Learning Performance

Nowadays, more and more dependent on

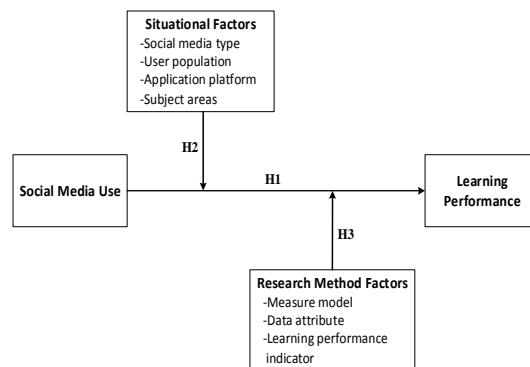
students in social media and easy access to information and data on the Internet, which is why the students' learning skills and research ability, in some cases, the reason of the decline, because they are on the participation of the social media spread their attention, make them spend less time on study, resulting in a decline in their academic performance (Hoffmann and Bublitz, 2017). When students spend more time on social media, they spend less time on face-to-face social contact, and these habits will reduce their communication skills (le Roux and Parry, 2017). The time students waste on social media may also cause them to sometimes miss opportunities (Tella, 2014). Good communication skills are the key to success. Students who overuse social media may not be able to effectively communicate and socialize face to face, which will also affect their physical and mental health (Kelly et al., 2014). Excessive use of social media is not healthy, every day because it enables students to avoid establish face-to-face contact (Ceranoglu, 2018), education workers have the responsibility to help students understand the negative impact of social media on the health, they should make students realize that if you spend too much time on social media, they will lose what (Colliander, 2017) in the real world. Social media platforms have also been criticized for spreading and fostering negative emotions, which have a net negative impact on students. Rosen et al. (2013) studied the social

media use behavior of college students and found that participants were distracted by Facebook and other social media less than 6 minutes after the start of learning, and daily Facebook use behavior was a strong predictor of non-task behavior during the study. In addition, some students use online terms for homework, exams and essays, suggesting that social media blurs the distinction between formal and informal writing. Considering the pros and cons of social media, parents should be to specification of children using social media, because the negative impact of social media may affect students' learning achievement (Kim et al., 2018), this may be because social media is more attractive for students, let them learn or search online course material to avoid boredom, shift their attention from academic (Bozoglan, 2017).

III. Hypotheses Development and Research Model

Above all, does the social media use has a positive or negative effect on learning performance? How strong is the effect? What factors contribute to heterogeneity in existing literature? Based on this, this study determined by “social media use” as the independent variable, “learning performance” as the dependent variable, according to the research contents and conclusions of sample literature.

And this research used the social media use situation factors such as social media type, use population, application platform, subject areas and research methods like measurement model, data attribute and learning performance indicators as moderation variables. Based upon literature review, this study decided that the situational factors and the research methods may be influential factors and can affect between the two variables among social media use and learning performance. Therefore the research model was shown in figure 1 and three research hypotheses were proposed as follows:



<Figure 1> Research Model

- H1: The social media use has a significant positive impact on learning performance.*
- H2: Situational factors of social media use have a moderating effect on the relationship between social media use and learning performance.*
- H3: Research method factors have a moderating effect on the relationship*

between the use of social media and learning performance.

IV. Research Method and Literature Search

4.1 Research Method

Meta-analysis used in this research can combine the quantitative data from different empirical studies, focus on the same research problem, and finally reach a research conclusion. In this study, the data were comprehensively evaluated according to the analysis steps of Hunter and Schmidt (1990), and CMA2.0 (Comprehensive meta-analysis 2.0) was used in combination with SPSS 22 for data processing and statistical analysis. In view of the fact that only regression coefficients were reported in some studies, the transformation formula was used to convert Beta coefficients into correlation coefficients and then included in meta-analysis (Peterson and Brown, 2005). The transformation formula was: $r = \beta \times 0.98 + 0.05$ ($\beta \geq 0$), $r = \beta \times 0.98 - 0.05$ ($\beta < 0$) ($\beta \in (0.5, 0.5)$). In the calculation process, the correlation coefficient r value in each study was modified to avoid the attenuation deviation of correlation coefficient caused by the reliability defect of the scale (Hunter and Schmidt, 1990). In view of the absence of variable reliability values in individual studies,

weighted average reliability in the study of similar constructs was used in this paper instead (Geyskens, Steenkamp and Kumar, 1998). Finally, CMA 2.0 software was used for data processing and analysis of effect values, including homogeneity test, main effect test, adjustment effect test, publication bias analysis and sensitivity analysis.

4.2 Literature Search

The literature search database of this study is from the core collection of Web of Science, and the time span of literature retrieval is from 2011 to 2018. Take Social Media and Learning performance as the key words, including Social Media, Social Network, Facebook, Twitter, Wiki, Social Learning Media, Social Learning Networks, etc. Key words of Learning Performance include Learning Performance, Learning Achievements, Learning Outcomes, Learning Effect, Learning Effectiveness, etc. The language is English and the literature type is Article. A preliminary search of the literature yielded 82 articles. In this meta-analysis, the selection of literature follows the following principles : (1) The research must include social media use and learning performance variables, and the independent variables must be social media use. (2) The research must be an empirical research with statistical analysis of data. (3) The study must report the complete data of the

calculated effect size, such as sample size, correlation coefficient, F value or T value, average value or other convertible data indicators. (4) The samples between the studies must be independent. If the samples between the two studies are the same or overlap, only the studies with more detailed report content or larger samples will be selected. By studying the preliminary literature one by one, 35 independent empirical literatures that met the meta-analysis standard of this paper were finally obtained, and 35 independent samples were generated, involving 11,522 subjects.

4.3 Literature Coding

Based on the steps recommended by Lipsey and Wilson (2001), the data of 35 empirical literatures included in the meta-analysis were encoded. First, according to the research purpose and content, the main coder compiled the coding table and coding specification as the reference basis for the subsequent coding. The coding content consists of two parts: research characteristics and effect statistics. Research characteristics mainly include literature researchers, publication year, literature sources, sample size and sample characteristics, variable measurement methods and content indicators, theoretical models, etc. Effect statistics include Cronbach α , correlation coefficient, regression coefficient, p value, t value, standard error value, F value of

independent and dependent variables. In addition, since this study also involves the exploration of relevant moderating variables, 4 situational factors and measurement models, data attributes and learning performance indicators of social media types, use groups, application platforms and discipline areas are also coded. The coding system is shown in table 1. In order to ensure the accuracy of the encoding and the high reliability of the results, the two groups of staff coded the literature respectively. After the preliminary coding work was completed, all the coding contents were compared. For the inconsistent coding contents, a consensus was reached through backtracking and discussion. In this study, Cohen Kappa coefficient was used to calculate the consistency of the coding results, and the consistency coefficient was 0.89, indicating that the coding results were reliable.

V. Data Analysis

5.1 Effect Size Heterogeneity and Main Effect Test

Heterogeneity test measures the level of heterogeneity between effect sizes. If each effect size showed homogeneity, fixed effect model was adopted; otherwise, random effect model was adopted (Hedges and Vevea, 1998).

<Table 1> Coding Scheme

First Class Index	Second Class Index
Social Media Type	a1.Facebook a2.Twitter a3.YouTube a4.Wiki a5.Myspace
User Population	b1. Undergraduate b2.Graduate b3.Teacher
Application Platform	c1.Mobile Application c2.Desktop Application
Subject Areas	d1.Medicine d2. Natural Science d3. Sociology
Measure Model	e1.TAM e2.UGT e3.Others
Data Attribute	f1. Subjective Index f2.Objective Index
Learning Performance Indicator	g1. Learning Efficiency g2. School Record

<Table 2> Total Effect and Heterogeneity Test

Model	k	N	d	SE	Variance	95% CI		Heterogeneity		
						Lower	Upper	Q	df(Q)	P
Fixed	35	11522	0.373	0.02	0.00	0.335	0.411	500.115	34	0.000
Random	35	11522	0.486	0.08	0.01	0.323	0.650			

Note: k is quantity of literatures, N is the total number of subjects in all studies, d is effect size, 95% CI is 95% confidence interval.

The heterogeneity test results of this study (table 2) showed that Q value = 500.115 ($p < 0.05$), greater than the chi-square critical value of 34 corresponding degrees of freedom at the 95% confidence interval level of 134.37, indicating heterogeneity between studies. Therefore, the random effects model is adopted in this paper and the possible regulatory effects are further tested. In addition, the analysis results showed that $I^2 = 93.2 > 0.6$, indicating that about 93.2% of the observed variation was caused by the real difference in effect size, and the analysis results were relatively stable. $Tau^2 = 0.196$, indicating that 19.6% can be used to calculate the weight between studies, and the heterogeneity test result of the overall effect has statistical significance.

In this study, random effect model was selected for the main effect test, and the measurement standard of effect size proposed

by Hattie in 2009 was adopted. Hattie divided the effects into small effects ($ES \leq 0.2$), medium effects ($0.2 < ES \leq 0.6$) and large effects ($ES > 0.6$) according to the effect value (Hattie, 2009). Table 2 shows that a total of 35 independent study effect values were obtained in this paper. The effect values of the random effect model ranged from 0.32 to 0.65. The total number of subjects was 11522. The total effect amount of 35 studies was 0.49, greater than 0.2 but less than 0.6, and $p < 0.001$. The meta-analysis results showed that social media use had a significant moderating positive impact on learning performance, hypothesis 1 was supported.

5.2 Moderating Effect Test

Heterogeneity test results indicated (table 3-8) that situational factors (social media type,

user group, application platform and discipline area) and methodological factors (measurement model, data attributes and learning performance indicators) may regulate the relationship between social media use and learning performance. Therefore, regression analysis was used in this paper to further examine the moderating effect of two types of factors on the relationship between social media use and learning performance (see table 9). Since several correlation coefficients have been reported in some literatures, they are all taken as independent samples in the adjustment analysis. Therefore, the total number of samples and total number of subjects in the test results of partial adjustment effect exceed the whole.

(1) The Moderating effect of Situational Factors

Table 3 shows that the effect values of Facebook, YouTube, Wiki and Myspace are

respectively 0.616*** (k=12), 0.383*** (k=5), 0.384*** (k=7) and 0.438* (k=3), indicating that the use of Facebook has a significantly higher positive impact on learning performance, while YouTube, Wiki and Myspace have a significantly higher positive impact on learning performance. Heterogeneity test results were all significant (p<0.05), indicating that social media types had a moderating effect on the relationship between social media use and learning performance.

Table 4 shows that the effect values of undergraduates, postgraduates and teachers using social media are 0.482*** (k=21), 0.246* (k=10) and 0.427*** (k=4), respectively, which indicates that the use of social media by undergraduates and teachers is more predictive of learning performance than that of postgraduates. Heterogeneity test results were all significant (p<0.05), indicating that the use group had a moderating effect on the relationship between social media use and learning performance.

<Table 3> The Moderating Effect of Social Media Types on Social Media Use and Learning Performance

Social Media Type	k	N	μp	Heterogeneity		95% CI	Two-tailed Test	
				Q value	p value		z value	p value
Facebook	12	2679	0.616***	15.933	0.014	[0.445,0.788]	7.041	0.000
Twitter	8	2145	0.589	318.449	0.000	[-0.255,1.431]	1.367	0.172
YouTube	5	2674	0.383***	30.116	0.000	[0.198,0.568]	4.065	0.000
Wiki	7	2191	0.384***	0.841	0.007	[0.307,0.461]	9.751	0.000
Myspace	3	1833	0.438*	112.909	0.000	[0.003,0.872]	1.975	0.048

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, μp is the modified weighted average effect value.

<Table 4> The Moderating Effect of Using Population on Social Media Use and Learning Performance

Using Population	k	N	$\mu\rho$	Heterogeneity		95% CI	Two-tailed Test	
				Q value	p value		z value	p value
Undergraduate	21	7551	0.482***	53.415	0.000	[0.328,0.596]	6.776	0.000
Graduate	10	2842	0.246*	439.678	0.000	[0.091,0.872]	2.416	0.016
Teacher	4	1129	0.427***	33.24	0.004	[0.313,0.540]	5.910	0.000

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, $\mu\rho$ is the modified weighted average effect value.

<Table 5> The Moderating Effect of Application Platform on Social Media Use and Learning Performance

Application Platform	k	N	$\mu\rho$	Heterogeneity		95% CI	Two-tailed Test	
				Q value	p value		z value	p value
Mobile Platform	22	12226	0.422***	163.992	0.000	[0.257,0.586]	5.027	0.000
Desktop Platform	15	9384	0.587**	336.174	0.000	[0.223,0.952]	3.159	0.002

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, $\mu\rho$ is the modified weighted average effect value.

<Table 6> The Moderating Effect of Subject Areas on Social Media Use and Learning Performance

Subject Areas	k	N	$\mu\rho$	Heterogeneity		95% CI	Two-tailed Test	
				Q value	p value		z value	p value
Medicine	21	5846	0.478***	299.312	0.000	[0.224,0.732]	3.687	0.000
Natural Science	9	4223	0.561**	161.576	0.000	[0.179,0.944]	2.878	0.004
Sociology	5	1453	0.390***	18.176	0.001	[0.160,0.620]	3.323	0.001

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, $\mu\rho$ is the modified weighted average effect value.

Table 5 shows that the effect value of social media applications based on desktop platform is significantly higher than that of mobile platform: 0.587**, which indicates that social media desktop applications can improve learning performance more than mobile applications. Heterogeneity test results were all significant ($p < 0.05$), indicating that different application platforms have a moderating effect

on the relationship between social media use and learning performance.

Table 6 shows that the effect value of social media use in natural sciences is significantly higher than that in medical sciences 0.478*** ($k=21$) and social sciences 0.390*** ($k=5$), indicating that social media use in natural sciences can improve learning performance more than that in medical sciences and social

sciences. The heterogeneity test results were all significant ($p < 0.05$), indicating that different discipline areas have a moderating effect on the relationship between social media use and learning performance. In conclusion, the four situational factors of social media use, including social media type, user group, application platform and discipline field, have a moderating effect on the relationship between social media use and learning performance. Hypothesis 2 is supported.

(2) The Moderating Effect of Research Method Factors

Table 7 shows that by using the technology acceptance model (TAM) and the use of gratifications model (UGT) study on the impact of social media use on learning performance effect value were 0.545*** ($k = 17$) and 0.543 ($k = 12$), significantly higher than that of other research model 0.333** ($k = 8$), indicating that using TAM and UGT model can predict social media use more positive influence on learning performance. Heterogeneity test results were all significant

($p < 0.05$), indicating that different measure models had a moderating effect on the relationship between social media use and learning performance.

Table 8 shows that variable the effect value 0.552*** ($k=13$) using the subjective indicators is higher than the effect value of 0.472*** ($k=25$) using the objective indicators, learning performance value 0.493*** ($k=14$) using performance indicators is higher than value 0.479*** ($k=21$) using the learning effectiveness indicators, indicating that the variables take objective index to study, learning performance index can predict social media use more positive influence on learning performance. Heterogeneity test results were all significant ($p < 0.05$), indicating that different data attributes and learning performance indicators had a moderating effect on the relationship between social media use and learning performance. In conclusion, measurement model, data attributes and learning performance indicators have a moderating effect on the relationship between social media use and learning performance. Hypothesis 3 is supported.

<Table 7> The Moderating Effect of Measure Model on Social Media Use and Learning Performance

Measure Model	k	N	μp	Heterogeneity		95% CI	Two-tailed Test	
				Q value	p value		z value	p value
TAM	17	7143	0.545***	288.626	0.000	[0.258,0.831]	3.726	0.000
UGT	12	4293	0.543**	161.304	0.000	[0.185,0.900]	2.973	0.003
others	8	3102	0.333**	29.383	0.000	[0.121,0.546]	3.071	0.002

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, μp is the modified weighted average effect value.

<Table 8> The Moderating Effect of Data Attribute and Learning Performance Indicator on Social Media Use and Learning Performance

Moderating Variable	Category	k	N	μp	Heterogeneity		95% CI	Two-tailed Test	
					z value	p value		z value	p value
Data Attribute	Subjective Indicator	25	8639	0.472***	460.048	0.000	[0.236,0.709]	3.914	0.000
	Objective Indicator	13	5531	0.552**	27.502	0.007	[0.420,0.684]	8.219	0.000
Learning Performance Indicator	Learning Efficiency	21	5805	0.479***	437.337	0.000	[0.199,0.760]	3.349	0.001
	School Record	14	5717	0.493***	48.322	0.000	[0.358,0.628]	7.150	0.000

Note: *, **, *** respectively represent significant at the level of 0.05, 0.01 and 0.001, μp is the modified weighted average effect value.

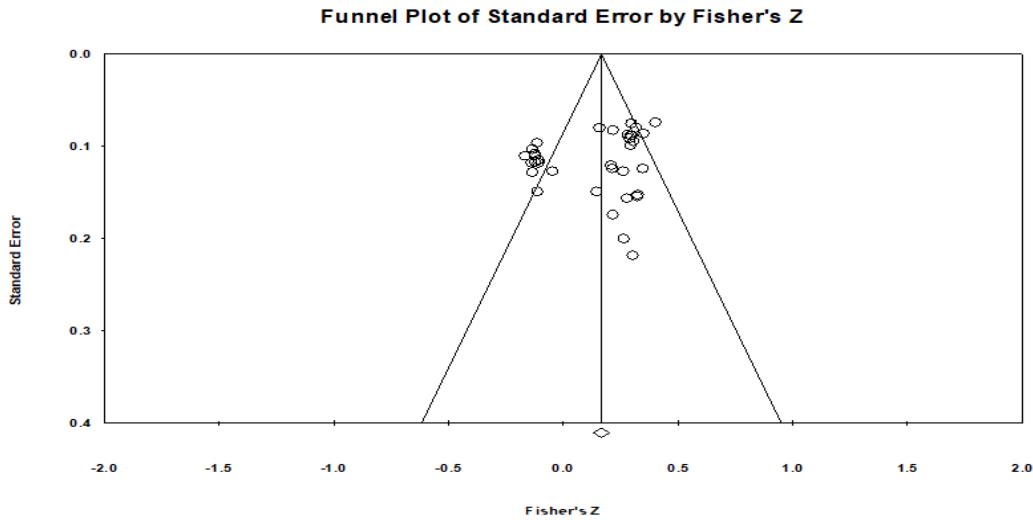
(3) Publication Bias Test

Publication bias refers to the tendency of research results with statistical significance to be more likely to be reported and published than results with no significant significance or invalid results (Xia Lingxiang, 2005). Publication bias measures how much research does not reach the significant level in order for the conclusion to reach the insignificant level. In this study, fail-safe N was introduced to detect the level of publication bias and to assess at least how many unpublished studies were needed to reduce the overall effect of the

study to an insignificant level (Rosenthal, 1979). If N is less than $5k+10$, attention should be paid to the effect of publication bias (Rothstein, Sutton and Borenstein, 2005). Table 9 shows that when the p value is 0.05, the loss factor N is 3364, which is far greater than the critical value 185 ($k = 35$). In addition, as shown in Fig. 2, the distribution of effect values in this study was mostly concentrated at the top of the funnel, and evenly distributed on both sides of the median line, indicating that there was little possibility of publication bias in this study. Based on the

<Table 9> Classic Fail-safe N

Literature analyzed in this study Z-value	19.31
Literature analyzed in this study P-value	0.00
Alpha	0.05
Tails	2
Z for alpha	1.96
Literature quantity analyzed in this study	35
When p value is greater than 0.05, the number of unpublished studies is required	3364



<Figure 2> Funnel Plot of Effect Value Distribution

above analysis results, it is shown that there is no risk of publication bias in the conclusion of meta-analysis.

(4) Sensitivity Analysis

In order to test whether there are outliers that affect the total effect value, this study further used one-study removed for sensitivity analysis to test the influence of extreme positive and negative effect values on the total effect value. According to the sensitivity test, the effect value after the deletion of any study is still 0.335-0.411 (fixed model) and 0.323-0.650 (random model) within the 95% confidence interval. Therefore, the deletion of any study will not affect the overall effect value, which indicates that the results of the meta-analysis in this study are very stable.

VI. Discussion and Conclusion

This research conducted the meta analysis methods for 2011-2018 nearly eight years from the international English journal of 35 empirical studies about the social media use and learning performance. The social media is growing all over the world and teenagers and students are joining these social media sites to interact with friends, family, teachers and strangers. Social media influence people's behavior, and technological progress has technically facilitated social interaction, information sharing and knowledge updating through social networks. The use of social media can bring about a positive and conducive learning environment, which can create a relaxed and harmonious relationship between teachers and students, promote the

co-creation of learning environment and knowledge, improve students' satisfaction with active collaborative learning, and thus improve their academic performance.

About the moderating effect of situational factors, the moderating effect of social media use type, user population, application platform and subject areas on the relationship between social media use and learning performance was supported. The meta-analysis results showed that the use of Facebook had a significant and high degree of positive impact on learning performance, while YouTube, Wiki and Myspace had a significant and medium degree of positive impact on learning performance. The use of social media by undergraduates and teachers are a better predictor of learning performance than graduate students. Some scholars also suggested that the most popular social media platforms in the country and region should be used (Abbas et al., 2019). Chinese scholars could explore online learning practices of WeChat, QQ and weibo social media and further explore the impact of specific social network platforms on learning performance.

Concerning the moderating effect of method factors, The moderating effect of the study's measure model, data attributes and learning performance indicators on the relationship between social media use and learning performance was also supported. The results of meta-analysis show that TAM and UGT can

better predict the positive effect of social media use on learning performance. Objective indicators and school record indicators are better predictors of the positive effects of social media use on learning performance. In the current research on the relationship between social media and learning performance, TAM and UGT model are widely adopted, because the acceptability, ease of use and perceived benefits of technology play a decisive role in students' choice to use social media. The research results of al-rahmi (2019) show that students' satisfaction with social media, ease of use and usefulness perception have a positive impact on their collaborative learning and participation, and ultimately their academic performance.

Although this study was based upon the english literature search only, it is very meaningful that this research can suggest the relationship between social media use and learning performance. However, limitations of this study were under literature review only and have to be compromise the real interview or investigation to users of social media in further research.

References

김정은, 김성준, 권두순, “소셜 네트워크 서비스 (SNS) 이용자들의 개인정보보호 행동에 관한 연구 : 보호동기이론을 중심으로

- 로”, 정보시스템연구, 25권, 3호, 2016, pp. 1-30.
- 김중기, 김진성, 최정철, “소셜 네트워크 서비스가 사회적 자본에 미치는 영향”, 정보시스템연구, 21권, 3호, 2012, pp. 163-186.
- Abbas, J., Aman, J., Nurunnabi, M, Bano, S. “The Impact of Social Media on Learning Behavior for Sustainable Education: Evidence of Students from Selected Universities in Pakistan”. *Sustainability*, 2019, 11, pp. 1683.
- Al-Rahmi W.M., Alias N., Othman M.S., Marin V.I. and Tur G., “A model of factors affecting learning performance through the use of social media in Malaysian higher education”. *Computers and Education*, 2018, Vol. 121, No. 6 , pp. 59-72.
- Bozoglan, B. *Psychological, Social, and Cultural Aspects of Internet Addiction*, IGI Global: Hershey, PA, USA, 2017
- Ceranoglu, T.A., “Inattention to Problematic Media Use Habits: Interaction between Digital Media Use and Attention-Deficit/Hyperactivity Disorder”. *Child Adolesc Psychiatr Clin N Am*, 2018, Vol. 27, No. 2, pp. 183-191.
- Hoffmann, C., Bublitz, W., “Pragmatics of Social Media”. *Politeness and impoliteness*. 2017, pp. 607-632.
- Kelly, Y.; Zilanawala, A.; Booker, C.; Sacker, “A. Social Media Use and Adolescent Mental Health: Findings from the UK Millennium Cohort Study”. *E Clinical Medicine*, Vol. 6, 2018, pp. 59-68.
- Kim, T.T.; Karatepe, O., Lee, G., Demiral, H. “Do Gender and Prior Experience Moderating the Factors Influencing Attitude toward Using Social Media for Festival Attendance?”, *Sustainability*, 2018, Vol. 10, pp. 3509.
- le Roux, D.B.; Parry, D.A., “In-lecture media use and academic performance: Does subject area matter?”. *Computers in Human Behavior*. 2017, Vol. 77, pp. 86-94.
- Nielsen, M.I.S.W., “Computer-mediated communication and self-awareness-A selective review”. *Computers in Human Behavior*, 2017, Vol. 76, pp. 554-560.
- Shepherd, S.V., Freiwald, W.A., “Functional Networks for Social Communication in the Macaque Monkey”. *Neuron*, 2018, Vol. 99, pp. 413-420.
- Stathopoulou, A., Siamagka, N.-T., Christodoulides, G., “A multi-stakeholder view of social media as a supporting tool in higher education: An educator-student perspective”. *European Management Journal*, 2019, Vol. 1, pp. 8-10.
- Tella, A., *Social Media Strategies for Dynamic Library Service Development*, IGI Global: Hershey, PA, USA, 2014.
- Terzi, B. Bulut, S. Kaya, N., “Factors affecting

nursing and midwifery students' attitudes toward social media". *Nurse Educ. Pract.*, 2019, Vol. 35, pp. 141-149.

Tulin, M. Pollet, T.V., Lehmann-Willenbrock, N., "Perceived group cohesion versus actual social structure: A study using social network analysis of egocentric Facebook networks". *Soc. Sci. Res.*, 2018, Vol. 74, pp. 161-175.

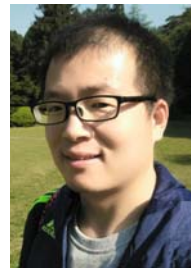
Wan, J., Lu, Y., Wang, B., Zhao, L. "How attachment influences users' willingness to donate to content creators in social media: A socio-technical systems perspective". *Information management*, 2017, Vol. 54, pp. 837-850.

박 기 호 (Park, Ki-Ho)



부산대학교 이공학과와 한양대학교 전자계산학 석사와 경영학박사 학위를 취득하였다. 현재 호서대학교 디지털기술경영학과 교수로 재직하고 있으며, 주요 관심분야는 사물인터넷 연구, 소셜미디어네트워크, 인공지능, 벤처와 창업가 정신 등이다.

런가우페이 (Ren, Gaufei)



현재 호서대학교 디지털기술경영학과 박사과정생이며, 교수로 재직하고 있으며, 주요 관심분야는 소셜미디어네트워크, 전자상거래연구 등이다.

<Abstract>

Does Social Media Use Increase or Decrease Learning Performance? A Meta-Analysis Based on International English Journal Studies

Park, Ki-Ho · Ren, Gaufei

Purpose

This paper is to make a meta-analysis of the relationship between the social media use and learning performance as well as its potential moderating variables to clarify the differences in research conclusions in existing literatures, and refine the situational and method factors that affect the relationship between them.

Methodology

Meta-analysis used in this study can combine the quantitative data from different empirical studies, focus on the same research problem, and finally reach a research conclusion.

Findings

The results show that social media use and learning performance have a moderating positive correlation. The moderating effect test of usage scenarios shows that social media types, usage groups, application platforms and discipline fields have moderating effects on the relationship between social media use and learning performance. The moderating effect test of the research method found that measurement models, data attributes and learning performance indicators also had moderating effects on the relationship between social media use and learning performance.

목적

본 연구는 2011년부터 8년간의 영문문헌에 대해 메타분석법을 이용하여 소셜미디어의 사용과 학습성과간의 관계를 규명하고자 하였다. 또한 소셜미디어 사용 상황과 연구분석방법론 변인의 조절효과 여부를 분석하였다.

연구방법론

주요 연구방법으로 유사한 연구 의문점이 제시된 선행의 실증연구들에 대해 메타분석기법을 사용하였으며, 문헌분석을 통해 정량적 데이터를 도출하고, 이를 실증 분석하였다.

연구결과

연구결과로 소셜미디어의 사용과 학습성과간에는 정의 상관을 보였으며, 상황변수와 연구방법론 변수가 조절효과를 보였다. 상황변수의 구성개념으로는 소셜미디어형태, 사용자 집단, 플랫폼 종류 등으로 하였고, 분석을 위한 측정방법 변수에는 측정모형, 데이터속성 등의 개념으로 구성하였다.

Keyword: *Social Media Use, Learning Performance, Meta-Analysis, moderating Effect, Social Network Service*

* 이 논문은 2019년 11월 30일 접수, 2019년 12월 6일 1차 심사, 2019년 12월 21일 게재 확정되었습니다.