Educational usage of Facebook and academic achievement in distance university students: Mediated by basic needs satisfaction

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Abstract
Facebook has been widely used among students, not only for socializing, but also for educational purposes. However, it is much less clear whether educational usage of Facebook would be beneficial for student academic achievement, especially in distance education. This paper examined whether different types of educational usage of Facebook would be differentially connected with academic achievement of distance university students. Unlike previous studies, we distinguished between the quantity and the quality of educational usage of Facebook: The former is concerned with time spent, while the latter includes three types of educational utilities offered by Facebook (communication, collaboration, and resource sharing). Taking a self-determination theory perspective, we also examined whether the connection between different types of educational usage of Facebook and academic achievement would be mediated by basic needs satisfaction in distance study. A total of 274 distance university students participated in an online survey. A path analysis demonstrated that different types of educational usage of Facebook and academic achievement were not directly associated. However, a mediation analysis showed that competence need satisfaction (and no other needs) fully mediated some linkages: time spent to achievement, communication to achievement, and resource sharing to achievement. Findings and implications of this paper are discussed.

Keywords Educational usage of Facebook · Basic needs satisfaction · Academic achievement · Distance university

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1 Introduction

Facebook has become the most successful social medium among young people with around 2.41 billion monthly active users worldwide (Zephoria, 2019), as Facebook allows a number of features to connect to others and share information, emotions, and experiences. In the last few years, research on Facebook has received great attention among educational researchers, especially an investigation of the connection between Facebook usage and student academic achievement. So far, existing research has demonstrated mixed results on this connection. For instance, numerous researchers reported that Facebook usage for socializing purposes was negatively associated with student academic achievement (e.g., Bou-Hamad, 2020; Junco, 2011; Kirschner & Karpinski, 2010), while this connection was not confirmed in some previous studies (e.g., Maheshwari & Mukherjee, 2021; Pasek et al., 2009). In contrast, using Facebook in the context of education was found to be beneficial for student academic achievement (e.g., Al-Rahmi et al., 2015; Al-Rahmi & Zeki, 2017). Additionally, a number of researchers sought to explain students’ reasons for adopting Facebook for educational purposes. As a pioneer work, Mazman and Usluel (2010) proposed three types of educational usage of Facebook on the basis of educational utilities offered by Facebook: communication, collaboration, and resource sharing. However, it remains unclear which educational utilities offered by Facebook may contribute to greater student academic achievement.

Self-determination theory (SDT) suggests that the satisfaction of the three basic psychological needs—need for autonomy, need for competence, and need for social relatedness—contributes positively to self-determined forms of motivation as well as achievement and well-being (for an overview, see Deci & Ryan, 2000). In the last few years, research on Facebook usage and its positive consequences has received increasing attention among SDT researchers. Several studies indicated that Facebook usage can help people to meet their basic psychological needs, thereby promoting positive outcomes such as enjoyment of using Facebook and well-being (e.g., Akbari et al., 2015; Reinecke et al., 2014; Sheldon et al., 2011). To date, relatively little is known about characteristics of educational usage of Facebook that would be beneficial for the satisfaction of the three basic needs. To our best knowledge, the question of whether basic needs satisfaction would play a mediating role in the relationship between educational usage of Facebook and academic achievement has not systematically been investigated.

Taken together, the present study aimed to examine different types of educational usage of Facebook and their associations with student academic achievement. Taking an SDT perspective, we examined whether these associations would be mediated by basic needs satisfaction as a secondary issue. According to the literature review, it must be noted that previous studies were conducted with students from presence colleges and universities where virtual settings are only an addition to the real classroom. Unlike past research, the present study focused particularly on educational usage of Facebook in the context of distance education. In this context, students spend most of their time pursuing their studies.
online and personal meetings are rare. Indeed, it is worth examining the role of educational usage of Facebook in promoting student achievement in different educational contexts in order to gain a better understanding if Facebook can be a useful educational tool for every educational context.

1.1 Facebook usage for socializing purposes and student academic achievement

According to our literature review, previous research has defined Facebook usage for socializing purposes in a variety of ways. Most of the existing research focused on the quantity of Facebook usage that is frequency or duration of Facebook usage. For instance, these studies demonstrated that Facebook usage for socializing purposes—or time spent on various activities on Facebook such as status update, wall posts, and chatting—among college and university students was negatively associated with their academic achievement as typically measured in terms of the actual GPA (e.g., Junco, 2011; Michikyan et al., 2015). Likewise, Kirschner and Karpinski (2010) found that university students using Facebook reported lower GPA in comparison to their peers who did not use Facebook. Contrary to these studies, other studies found no significant connections between Facebook usage of students and their GPA (e.g., Kolek & Saunders, 2008; Pasek et al., 2009). According to inconsistent results of Facebook usage for socializing purposes and student academic achievement, some researchers decided not to simply measure Facebook usage in terms of frequency or duration of Facebook usage, but they rather focused on the quality of Facebook usage such as users’ emotional connectedness to Facebook and integration of Facebook into users’ daily activities (e.g., Ainin et al., 2015; Ellison et al., 2007; Steinfield et al., 2008). Among these researchers, Ainin et al. (2015) also examined in their study the connection between the quality of Facebook usage and student academic performance. But this time, they measured student academic performance in terms of students’ perceived academic performance (e.g., I feel competent conducting my course assignment) and interestingly found a positive correlation between Facebook usage and student academic performance.

1.2 Educational usage of Facebook and student academic achievement

Unlike Facebook usage for socializing purposes, the quality of educational usage of Facebook—as especially defined in terms of the use of Facebook for collaboration in learning situations—tends to promote student academic achievement. For instance, a study by Al-Rahmi et al. (2015) highlighted the role of social media for collaborative learning in class. The study revealed that three types of social media usage—interactivity with research group members, interactivity with supervisors, and intention to use social media—were positively associated with collaborative learning and engagement, thereby connecting with greater satisfaction of collaborative learning and greater academic performance of students and researchers. Likewise, Al-Rahmi and Zeki (2017) examined whether social media usage for collaborative learning may help to enhance student performance. But this time, they focused specifically on the context of learning Quran and Hadith. The results revealed that time spent...
on social media usage for learning Quran and Hadith was positively associated with collaborative learning, thereby promoting student performance.

Up to this point, it must be noted that it is the quality (rather than the quantity) of Facebook usage that matters for student academic achievement. To define the quality of educational usage of Facebook more precisely, we referred to Mazman and Usluel (2010), the first working group that attempted to explain students’ adoption process of educational usage of Facebook.

In their study, Mazman and Usluel (2010) proposed and examined a structural model to explain the associations between adoption of Facebook (i.e., usefulness, ease of use, social influence, facilitating conditions, community identification), purposes of Facebook usage (i.e., social relations, work-related, daily activity), and educational usage of Facebook. In this model, a three-factorial structure of the educational usage of Facebook was proposed: communication, collaboration, and resource sharing. **Educational usage of Facebook for communication** includes features such as (study-related) chatting or participating in group discussions. **Educational usage of Facebook for collaboration** includes features such as jointly preparing course material or organizing work together. **Educational usage of Facebook for resource sharing** includes features such as sharing summaries of study material, or posting relevant links on Facebook. The findings revealed that students’ purposes of Facebook usage mediated the connections between students’ adoption of Facebook and students’ educational usage of Facebook. Mazman and Usluel’s model has been replicated in numerous studies (e.g., Manasijević et al., 2016; Sánchez et al., 2014; Toker & Baturay, 2019). However, an investigation of the connections between the three types of educational usage of Facebook proposed by Mazman and Usluel (2010) and student academic achievement is still awaiting researchers’ interest. To our best knowledge, these connections have not yet been investigated so far.

**1.3 Mediation by basic needs satisfaction**

As mentioned earlier, we anticipated that the connection between Facebook usage and student achievement might be explained by another mechanism. To explore a possible mechanism, we referred to the well-known self-determination theory (SDT), an approach to human motivation and well-being (Deci & Ryan, 2000). SDT postulates that individuals have three basic needs—for autonomy, social relatedness, and competence—and that basic needs satisfaction is essential to the facilitation of individuals’ self-determined motivation, performance, and well-being. Most importantly, SDT highlights the role of social contexts—for instance, socialization in school by teachers or socialization at home by parents—in promoting basic needs satisfaction (for an overview, see Deci & Ryan, 2000). Past SDT research has provided empirical evidence for these assumptions (e.g., Church et al., 2013; Marshik et al., 2017; Niemiec et al., 2006).

Linking the SDT assumption about basic needs satisfaction to research on Facebook usage, previous research demonstrated that social networking such as Facebook can help the users meet their basic psychological needs, thereby promoting the users’ positive outcomes. For instance, Reinecke et al. (2014) found that
Facebook-specific autonomy need satisfaction (e.g., feeling autonomous when using Facebook) and Facebook-specific competence need satisfaction (e.g., feeling competent when using Facebook) of university students were positively associated with Facebook enjoyment and that both forms of needs satisfaction mediated the link between students’ perceived social pressure to use Facebook and Facebook enjoyment. However, Facebook-specific social relatedness need satisfaction was not associated with Facebook enjoyment.

Focusing particularly on social relatedness need satisfaction, Sheldon et al. (2011) conducted a series of empirical research to investigate a two-process view of Facebook usage and social relatedness need satisfaction in university students. The results demonstrated positive relations of the quantity of Facebook usage to social relatedness need satisfaction (connection) as well as to social relatedness need dissatisfaction (disconnection). The results showed that greater disconnection was connected with greater Facebook usage as coping strategy, thereby enhancing the quantity of Facebook usage. On the other hand, greater connection contributed to greater positive experiences within the Facebook context, thereby enhancing the quantity of Facebook usage.

In the same vein, Lin (2016) investigated associations between attachment styles (i.e., secure, avoidant, and anxious), time spent on Facebook, relatedness need satisfaction, and five aspects of psychological well-being (i.e., well-being, loneliness, social life satisfaction, Facebook sense of community, and perceived social support). The results revealed that secure and anxious attachment styles of university students were positively associated with social relatedness need satisfaction, thereby promoting students’ psychological outcomes.

Akbari et al. (2015) addressed the question of whether Facebook would be an effective learning environment for learning the English language that promotes students’ basic needs satisfaction and their English learning outcomes. The authors compared the differences in basic needs satisfaction (i.e., autonomy, competence, social relatedness) and student learning outcomes between two English learning groups: a face-to-face group and a Facebook group. An intervention for each learning group lasted one month. The results revealed that students in the Facebook group reported higher levels of three basic needs and scored higher than students in the face-to-face group. For the whole group, the authors found significant correlations between three basic needs and learning outcomes, while these correlations were not found to be significant in separated groups. Relatedness and competence were found to be significant predictors of student learning outcomes. However, the authors did not examine whether Facebook usage for learning the English language would be mediated by basic needs satisfaction.

1.4 The present study

The particular focus of this paper was on the context of distance university. This paper was conducted at FernUniversität in Hagen where a modular object-oriented dynamic learning environment (Moodle) is used as the central platform for teaching and learning. In Moodle, a wide range of learning activities can be created, for
instance, polls, forums, chats, feedback, and so forth (helpdesk Wiki, 2019). As a further alternative learning platform, most of the distance university students at FernUniversität in Hagen also use a wide range of Facebook groups to make contact with fellow students and discuss learning contents. To date, nearly 100 Facebook groups among different study programs have been created (FernUniversität in Hagen, 2019a). However, it remains unclear whether educational usage of Facebook would help distance university students to improve their academic achievement. The aim of the present study was twofold. First, we examined the connections between four types of educational usage of Facebook and academic achievement of distance university students. Unlike previous studies, we distinguished between the quantity (time spent) and the quality (in which way) of educational usage of Facebook. Overall, four types of educational usage of Facebook were examined: three types for the quality derived from Mazman and Usluel’s model (communication, collaboration, and resource sharing) and one type for the quantity (time spent on educational usage of Facebook).

On the basis of the literature review in the previous section, we proposed that four types of educational usage of Facebook would be connected with greater academic achievement of distance university students. Second, we examined the mediating effects of basic needs satisfaction in distance study on these connections. In the present study, we, for the first time, linked the model of educational usage of Facebook by Mazman and Usluel (2010) to the SDT assumption about basic needs satisfaction. On the basis of the SDT assumption, we predicted that basic needs satisfaction in distance study would mediate the relations of four types of educational usage of Facebook to student academic achievement. In terms of covariates, we controlled for student age for two reasons: (a) Facebook is often seen as a medium for young people (e.g., Junco, 2012; Michikyan et al., 2015) and (b) the average age of the distance university students at FernUniversität in Hagen is considerably higher than in traditional universities (FernUniversität in Hagen, 2019b). In addition, high school grade—as required as a university entrance qualification—was also controlled for. Past research suggested that high school grade-point average can be seen as an indicator of overall intelligence that influences academic achievement (Chamorro-Premuzic & Furnham, 2008; Rohde & Thompson, 2007).

2 Method

2.1 Participants and procedure

The present study was a descriptive research. An online survey was created by using Questback’s online survey program “Unipark”. Only participants who indicated that they had Facebook accounts and used Facebook for educational purposes were allowed to take part in the survey. Using filter questions in Unipark, participants were asked if they had Facebook accounts and used Facebook for educational purposes. Participants who indicated that (a) they did not have Facebook accounts and that (b) they had Facebook accounts but they did not use Facebook for educational purposes received a notification that they were not the research
target group. Participants were a convenience sample of 274 distance university students who were enrolled in bachelor’s and master’s programs at FernUniversität in Hagen in summer semester 2017: 76% females, 57% bachelor’s degree students, 87% majoring in psychology. Participant age ranged between 19 and 69 ($M = 33.51$, $SD = 10.10$). All participants claimed to be fluent in German. A majority of 73% of the students reported that they spent 1–30 min every day using Facebook for educational purposes, while 22% of the students spent 31–60 min, and 5% of the students spent more than 61 min, respectively. The present study was conducted based on the recommendations and ethical guidelines of the German Psychological Society and the research standards of FernUniversität in Hagen. An ethics approval for the present study was therefore not required. Also, no formal ethic vote was sought due to the non-controversial nature of the study. All student participants were informed that their participation in the online survey would be anonymous and voluntary so that they could quit the online survey whenever they wanted without any disadvantages.

2.2 Measures

2.2.1 Educational usage of Facebook

Based on Mazman and Usluel (2010), we newly developed scales to assess three types of educational usage of Facebook: (a) communication (6 items; e.g., “I discuss study-related topics in Facebook groups.”), (b) collaboration (5 items; “I work together with my fellow students on the study material via Facebook.”), and (c) resource sharing (4 items; e.g., “I exchange study material on Facebook.”). Responses for these scales were given on a five-point rating scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Cronbach’s alpha coefficients were calculated in order to evaluate internal consistency reliabilities of the scales. According to Nunnally and Bernstein (1994), Cronbach’s alpha coefficients of smaller than .50 were considered not acceptable. Cronbach’s alpha coefficients in the range of .50 and .69 are considered moderate. Cronbach’s alpha coefficients in the range of .70 and .79 are considered satisfactory. Cronbach’s alpha coefficients of .80 or larger are considered good. Overall, internal consistency reliabilities for the scales were satisfactory to good: $\alpha = .86$ for communication, $\alpha = .87$ for collaboration, and $\alpha = .79$ for resource sharing. The results of exploratory factor analysis (EFA) demonstrated that 15 items loaded on three factors that accounted for 63.21% of the variance. A confirmatory factor analysis (CFA) of the three-factor measurement model of educational usage of Facebook was then performed by using Mplus 7.3 (Muthén & Muthén, 2012–2014). A model fit was evaluated based on a nonsignificant $\chi^2$ test, a comparative fit index (CFI) value of greater than .90, a standardized root mean square residual (SRMR) value of .08 or lower, and a root mean square error of approximation (RMSEA) value of .08 or lower (see McDonald & Marsh, 1990). Overall, the measurement model showed an acceptable model fit to the data, $\chi^2 (77, N = 274) = 190.13$, $CFI = .95$, $SRMR = .07$, $RMSEA = .07$. All standardized factor loadings proved statistically significant, ranging from .64 ($p < .001$) to .78 ($p < .001$). All factor correlations were significant and
positive, ranging from .38 (p < .01) to .78 (p < .001). All scale items and psychometric properties are shown in Table 1. As the fourth type of educational usage of Facebook, distance university students were asked to estimate their *time spent on educational usage of Facebook* (1 item; “How much time do you spend every day on Facebook for study-related purposes?”). The ranges of time spent included (1) 30 min or less, (2) 31–60 min, (3) 61–120 min, (4) 121–240 min, and (5) more than 240 min.

### 2.2.2 Basic needs satisfaction in distance study

To assess three mediator variables, we used the German version of the Balanced Measure of Psychological Needs Scale (Neubauer & Voss, 2016). Due to the limited length of the questionnaire, we adopted only positive items: (a) autonomy need satisfaction (3 items), (b) competence need satisfaction (3 items), and (c) social relatedness need satisfaction (3 items). However, the scale items were very slightly adjusted to fit the context of distance study. That is, wordings “during my distance study” or “within my distance study” were added in the items. Responses for these scales were given on a five-point rating scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Overall, all subscales yielded moderate to good internal consistency reliabilities: \( \alpha = .64 \) for autonomy need satisfaction (e.g., “During my distance study, I was free to do things my own way.”), \( \alpha = .81 \) for competence need satisfaction (e.g., “I was successfully completing difficult tasks and projects within my distance study.”), and \( \alpha = .85 \) for social relatedness need satisfaction (e.g., “During my distance study, I felt a sense of contact with people who care for me, and whom I care for.”). The CFA results of the three-factor measurement model demonstrated a good model fit to the data, \( \chi^2 (24, N = 274) = 42.42, CFI = .98, SRMR = .04, RMSEA = .05 \). All standardized factor loadings proved statistically significant, ranging from .57 (p < .001) to .84 (p < .001). All factor correlations were significant and positive, ranging from .25 (p < .01) to .67 (p < .001).

### 2.2.3 Academic achievement

Distance university students were asked to report their average grades that they have so far received in their current distance studies: 1.0 = best possible grade, 4.0 = lowest passing grade, and 5.0 = failing grade. Responses to the average grades were given on a 5-rating scale: 1 (fail: 4.1–5.0), 2 (sufficient: 3.6–4.0), 3 (satisfactory: 2.6–3.5), 4 (good: 1.6–2.5), and 5 (very good: 1.0–1.5). If the distance university students have not received any grades yet (20%) because, for instance, they were at an earlier stage of their studies or their grades had not been awarded yet, they were asked to estimate their probable average grades. According to the previous research, using self-reported grades would not be problematic at all because self-reported grades were found to be highly positively connected with actual grades in all subjects (e.g., Sticca et al., 2017). In this paper, 10% of the distance students had scored very good and 58% of the distance students had scored good. 28% of the participants had scored satisfactory. Only 4% of the distance students had so far
Table 1  Psychometric properties of the scales assessing the quality of educational usage of Facebook

| Scales                                                                 | M    | SD   | EFA Factor Loadings | CFA Factor Loadings |
|-----------------------------------------------------------------------|------|------|---------------------|---------------------|
|                                                                       |      |      | Factor 1            | Factor 2            | Factor 3            |                          |
|                                                                       |      |      |                     |                     |                     |                          |
| Educational usage of Facebook for communication (α = .86)             |      |      |                     |                     |                     |                          |
| 1. I discuss study-related topics in Facebook groups.                 | 3.28 | 1.26 | .41                 | .68                 | −.05                | .71                    |
| 2. I am writing to my fellow students on Facebook regarding study-related topics. | 3.14 | 1.26 | .29                 | .73                 | .02                 | .69                    |
| 3. I use the chat feature on Facebook to talk to my fellow students about my distance study. | 2.65 | 1.38 | .20                 | .70                 | .08                 | .64                    |
| 4. I participate in study-related discussions on Facebook.            | 3.16 | 1.24 | .42                 | .69                 | −.06                | .76                    |
| 5. I share with my fellow students about my experiences in distance study on Facebook. | 3.14 | 1.30 | .17                 | .79                 | .03                 | .73                    |
| 6. In order to plan my further distance study, I communicate with my fellow students about professors and lecturers. | 2.44 | 1.27 | .16                 | .69                 | .27                 | .64                    |
| Educational usage of Facebook for collaboration (α = .87)             |      |      |                     |                     |                     |                          |
| 1. I work together with my fellow students on the study material via Facebook. | 2.50 | 1.31 | .77                 | .28                 | .13                 | .75                    |
| 2. To prepare for the exam, I work on the study material together with my fellow students on Facebook. | 2.82 | 1.30 | .72                 | .29                 | .17                 | .74                    |
| 3. I use Facebook to discuss correspondence work assignments with my fellow students. | 2.89 | 1.29 | .77                 | .31                 | .11                 | .75                    |
| 4. I use Facebook to organize distance learning work assignments.      | 2.74 | 1.29 | .65                 | .25                 | .28                 | .65                    |
| 5. I work on common distance learning tasks within Facebook groups.    | 2.54 | 1.33 | .75                 | .21                 | .21                 | .73                    |
| Educational usage of Facebook for resource sharing (α = .79)          |      |      |                     |                     |                     |                          |
| 1. I exchange study material on Facebook.                             | 2.97 | 1.37 | .25                 | .19                 | .78                 | .77                    |
| 2. I benefit from the study material pool on Facebook.                | 3.57 | 1.33 | .07                 | −.05                | .87                 | .70                    |
| 3. I use Facebook to make my own summaries of the study material available to my fellow students. | 2.31 | 1.29 | .49                 | .27                 | .50                 | .78                    |
| 4. I use third-party summaries of the study material which I download via Facebook. | 3.13 | 1.45 | .19                 | −.02                | .82                 | .66                    |

All standardized CFA factor loadings proved statistically significant (p < .001). EFA factor loadings larger than .50 are shown in boldface.
scored with the sufficient grades, while 0% of the distance students had scored with the failing grades.

3 Results

3.1 Descriptive statistics and correlational findings

The means and standard deviations of all study variables as well as intercorrelations among study variables are shown in Table 2. The results revealed that distance university students reported high levels of most of the study variables, with the exception that they reported a moderate level of educational usage of Facebook for collaboration and a low level of perceived social relatedness need satisfaction in distance study. A correlational analysis revealed low to high intercorrelations among study variables. Significant correlation coefficients ranged from \( r = .14 \) (\( p < .05 \)) to \( r = .64 \) (\( p < .01 \)). Among the four types of educational usage of Facebook, there was only a significant positive correlation between educational usage of Facebook for resource sharing and student academic achievement. Four types of educational usage of Facebook were significantly positively correlated with perceived social relatedness need satisfaction in distance study. Excepting time spent on educational usage of Facebook, the other three types of educational usage of Facebook were significantly positively correlated with perceived competence need satisfaction in distance study. Significant positive correlations between educational usage of Facebook for communication and for resource sharing and perceived autonomy need satisfaction in distance study were found.

3.2 Associations between educational usage of Facebook and student academic achievement: Mediated by basic needs satisfaction in distance study

To examine the assumed associations among study variables and the mediating effects of basic needs satisfaction in distance study, we performed a path analysis using Mplus 7.3. (Muthén & Muthén, 2012–2014). As mentioned earlier, a model fit was evaluated based on the criteria proposed by McDonald and Marsh (1990). Figure 1 displays the path model with significant standardized parameter estimates for the assumed associations among study variables. In this model, all study variables served as manifest variables. To control for the student backgrounds (i.e., student age and high school grade), we estimated the relations of both control variables to four types of educational usage on Facebook, basic needs satisfaction in distance study, and student academic achievement. All standardized parameter estimates are also shown in Table 3.

Overall, the path model demonstrated a good fit to the data, \( \chi^2 (4, N = 274) = 11.64, CFI = .98, SRMR = .03, RMSEA = .09 \). Contrary to our expectations, the results demonstrated no significant relations of four types of educational usage of Facebook to student academic achievement after controlling for
Table 2 Descriptive statistics and correlational findings

|                      | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
|----------------------|------|------|------|------|------|------|------|------|------|------|
| 1. Time spent on EFB |      |      |      |      |      |      |      |      |      |      |
| 2. EFB for communication | .33** |      |      |      |      |      |      |      |      |      |
| 3. EFB for collaboration | .33** | .64** |      |      |      |      |      |      |      |      |
| 4. EFB for resource sharing | .20** | .39** | .59** |      |      |      |      |      |      |      |
| 5. Autonomy need satisfaction | −.08 | .12* | .07  | .14* |      |      |      |      |      |      |
| 6. Competence need satisfaction | −.06 | .19** | .18** | .25** | .50** |      |      |      |      |      |
| 7. Social relatedness need satisfaction | .22** | .37** | .32** | .31** | .19** | .24** |      |      |      |      |
| 8. Academic achievement | −.03 | .07 | .07 | .14* | .04 | .27** | .09 |      |      |      |
| 9. Student age | .09 | .18** | .14* | .05 | −.03 | .15* | .25** | .02 |      |      |
| 10. High school grade | −.06 | .00 | −.02 | −.08 | −.02 | −.06 | .04 | .23** | −.03 |      |
| *M* | 1.32 | 2.97 | 2.70 | 2.92 | 3.50 | 3.81 | 2.58 | 3.74 | 33.51 | 3.74 |
| *SD* | .57 | .99 | 1.05 | .99 | .79 | .76 | 1.05 | .69 | 10.6 | .66 |

*p < .05. **p < .01. EFB = Educational usage of Facebook
the student backgrounds. In terms of the effects of student backgrounds, student age was significantly positively associated with educational usage of Facebook for communication, educational usage of Facebook for collaboration, and social relatedness needs satisfaction in distance study. High school grade was significantly positively associated with student academic outcome.

In terms of the relations of four types of educational usage of Facebook to basic needs satisfaction in distance study, time spent on educational usage of Facebook was negatively associated with two assumed mediators: autonomy and competence needs satisfaction in distance study. Educational usage of Facebook for communication was significantly positively associated with three assumed mediators. Likewise, educational usage of Facebook for resource sharing was significantly positively associated with three assumed mediators. However, educational usage of Facebook for collaboration was not significantly associated with any assumed mediators. In terms of the relations of basic needs satisfaction in distance study to student academic achievement, autonomy need satisfaction in distance study was negatively associated with student academic achievement, while competence need satisfaction in distance study was positively associated with student academic achievement.
|                      | Time spent | Communication | Collaboration | Resource Sharing | Autonomy NS | Competence NS | Relatedness NS | Academic Achievement |
|----------------------|------------|---------------|---------------|------------------|-------------|---------------|-----------------|----------------------|
|                      | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  | β  | SE  |
| Time spent           | −.15* | .07  | −.18** | .06  | .09  | .06  | −.01  | .06  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Communication        | .19*  | .08  | .18*  | .08  | .26*** | .07  | .02  | .08  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Collaboration        | −.11  | .09  | −.03  | .09  | −.04  | .08  | −.08  | .09  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Resource sharing     | .15*  | .08  | .23** | .07  | .22**  | .07  | .13  | .07  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Autonomy NS          | −.14* | .07  |                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Competence NS        | .32*** | .07  |                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Relatedness NS       | .01  | .07  |                       |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Student age          | .08  | .06  | .16** | .06  | .13*  | .06  | .04  | .06  | −.05  | .06  | .12  | .06  | .18**  | .06  | −.03  | .06  |   |   |   |   |   |   |
| High School Grade    | −.05  | .06  | .00  | .06  | −.02  | .06  | −.09  | .06  | −.03  | .06  | −.06  | .06  | .06  | .06  | .25*** | .06  |   |   |   |   |   |
| $R^2$                | .01  | .03  | .02  | .01  | .05*  | .12** | .22*** | .15*** |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

$N=274$. ***$p<.001$. **$p<.01$. *$p<.05$. NS = Need Satisfaction. Control variable names are italicized.
However, social relatedness need satisfaction in distance study was not significantly associated with student academic achievement.

The results of mediation analyses based on 5000 bootstrapped samples (95% confidence intervals) revealed significant indirect effects of competence need satisfaction in distance study (and no other needs satisfaction) on three linkages. That is, the relation of time spent on educational usage of Facebook to student academic achievement (indirect effect: $\beta = -0.06, p < .05$, 95% CI$[-0.10, -0.01]$), the relation of educational usage of Facebook for communication to student academic achievement (indirect effect: $\beta = 0.06, p < .05$, 95% CI$[0.01, 0.10]$), and the relation of educational usage of Facebook for resource sharing to student academic achievement (indirect effect: $\beta = 0.07, p < .01$, 95% CI$[0.02, 0.12]$).

4 Discussion

The aim of the present study was twofold. First, we examined the connections between different types of educational usage of Facebook and academic achievement of distance university students. Unlike past research, we distinguished between the quantity and the quality of Facebook usage: The former is concerned with the amount of time spent on Facebook, while the latter refers to three educational utilities offered by Facebook (i.e., communication, collaboration, and resource sharing). Second, we examined whether basic needs satisfaction in distance study would act as crucial mediators in these connections.

4.1 Educational usage of Facebook and academic achievement

With regard to the question of whether educational usage of Facebook would be associated with student academic achievement, we could not replicate the results as revealed in most of the previous research (e.g., Ainin et al., 2015; Al-Rahmi et al., 2015; Junco, 2011). A path analysis showed neither positive nor negative associations between four types of educational usage of Facebook and student academic achievement even when student age and previous academic achievement (high school grade) were controlled for. However, the results of the present study were in line with some previous studies which also found no connections between Facebook usage and student academic achievement (e.g., Kolek & Saunders, 2008; Pasek et al., 2009). The unexpected results still seem to support our other anticipation that the connection between educational usage of Facebook and student academic achievement would rather be explained by another mechanism such as the mediating role of basic needs satisfaction which will be discussed next.
4.2 Mediation by basic needs satisfaction in distance study

As expected, the mediation analyses revealed some interesting results. In this section, we will begin with the discussion of the results with regard to correlational conditions for the mediation and then the discussion of the mediation results will follow.

4.2.1 Different types of educational usage of Facebook associated with basic needs satisfaction in distance study

The results of the present study showed that two out of three types of the quality of Facebook usage (i.e., communication and resource sharing) appear to be beneficial for the satisfaction of the three basic needs, whereas Facebook usage for collaboration and the quantity of Facebook usage (time spent) appear not to be supportive of the basic needs satisfaction. Distance university students—who report greater Facebook usage for communication (e.g., discussing study-related issues with fellow students) and greater Facebook usage for resource sharing (e.g., exchanging study materials with fellow students)—tend to report greater satisfaction of the three basic needs. Up to this point, our results add to the SDT literature and also extend Mazman and Usluel’s model (Mazman & Usluel, 2010) in the sense that we could provide evidence for high-quality types of educational usage of Facebook that seem to be beneficial for basic needs satisfaction. In terms of the quantity of Facebook usage, distance university students who spend more time on Facebook usage for studying report less autonomy need satisfaction and less competence need satisfaction. However, the expected connection between time spent on educational usage of Facebook and social relatedness need satisfaction was not found. Contrary to our expectations, these results were opposed to the results of the previous research that revealed a positive relationship between Facebook time and social relatedness need satisfaction (e.g., Sheldon et al., 2011). Moreover, no connections between educational usage of Facebook for collaboration (e.g., working together with fellow students on the assignments on Facebook) and the satisfaction of the three basic needs were found. In fact, this is not surprising and there might be a common explanation for these unexpected results. As noted earlier, the digital platform Moodle is mainly used for teaching and learning at FernUniversität in Hagen, while Facebook learning groups appear to be optionally used here. When it comes to collaborative learning, it might be that distance university students rather stay connected to work together with their professors and fellow students via Moodle platforms instead of Facebook. Therefore, Facebook usage for collaboration may not help distance university students meet their basic needs. In the similar vein, distance university students might primarily spend time on Moodle platforms instead of Facebook when it comes to study-related issues. In the present study, we did not attempt to compare the effectiveness of Moodle and Facebook. Yet, it is worthy to address this issue in future research.
4.2.2 Basic needs satisfaction in distance study associated with academic achievement

According to the central SDT assumption (e.g., Deci & Ryan, 2000), the satisfaction of the three basic needs may result in better academic achievement. In this paper, we examined the link between each need satisfaction and student academic achievement. In line with the SDT assumption, the results showed that distance university students who report greater competence need satisfaction tend to report greater academic achievement. As opposed to the SDT assumption and previous research (e.g., Akbari et al., 2015; Marshik et al., 2017), we found that distance university students who report greater autonomy need satisfaction tend to report less academic achievement. Moreover, social relatedness need satisfaction was not associated with student academic achievement. With regard to the unexpected results, students’ motivational characteristics could play a mediating role in this relationship. For instance, a most recent SDT research by Carmona-Halty et al. (2019) indicated that the satisfaction of students’ basic needs was not directly associated with their academic performance. Yet, this relationship was fully mediated by psychological capital, including four components: hope, efficacy, resilience, and optimism. A mediation issue for this connection should be therefore addressed in more depth in future studies.

4.2.3 Mediating role of basic needs satisfaction

Among the three basic needs, the results demonstrated that competence need satisfaction (and no other needs satisfaction) was found to be a crucial full mediator. However, it only fully mediated three linkages: (a) the relation of time spent on educational usage of Facebook to student academic achievement, (b) the relation of educational usage of Facebook for communication to student academic achievement, and (c) the relation of educational usage of Facebook for resource sharing to student academic achievement. This means that distance university students who spend less time on educational usage of Facebook on the one hand and report greater Facebook usage for communication and resource sharing on the other hand tend to report greater academic achievement. Our results suggest that—among different types of educational usage of Facebook—only the two types of Facebook usage for communication (e.g., discussing study-related topics in Facebook groups, writing to fellow students on Facebook regarding study-related topics) and resource sharing (e.g., sharing study materials such as interesting articles, sharing summaries of study materials or benefitting from such materials) appear to be effective online studying methods that encourage distance university students to feel more competent in their studies, thereby increasing their academic achievement.

Taken together, the results of our mediation analysis provided evidence that Mazman and Usluel’s model and the SDT assumption may help to explain the role of educational usage of Facebook in promoting student achievement. Most importantly, it is not about the quantity of educational usage of Facebook, but it is the quality that counts.
4.3 Limitations and recommendations for future research

Several limitations to this paper and recommendations for improving the research quality should be noted. First of all, we only addressed the question of how distance university students would benefit from educational usage of Facebook—through basic needs satisfaction—in terms of academic achievement. Future research may want to investigate further SDT-related outcomes for academic success such as motivational characteristics and well-being. In a number of earlier studies, such student outcomes have been found to be associated with Facebook usage (e.g., Lin, 2016; Reinecke et al., 2014). Second, previous research attempted to explain reasons for educational usage of Facebook. These factors were, however, not examined in this paper. To extend our working model, it will be interesting to include possible variables that motivate students to use Facebook for studying such as social influence or social pressure (e.g., Mazman & Usluel, 2010; Reinecke et al., 2014). Third, the majority of student participants (87%) were psychology students. Thus, the generalization of our results is primarily limited to the context of psychology study. Since educational usage of Facebook might possibly differ depending on the field of study, future research should therefore recruit more distance university students from other fields of study. An investigation of differences in educational usage of Facebook across fields of study will be interesting. Fourth, as mentioned earlier, distance university students at FernUniversität in Hagen mainly used Moodle as the central platform for their studies and Facebook seems to be used for their studies optionally. It will be interesting for the researchers to compare the effects of both tools on student academic achievement. Fifth, we claimed that most of the previous research on educational usage of Facebook was conducted in the context of presence university education. Yet, our working model was, for the first time, examined in a sample of distance university students. It is therefore worthwhile to replicate our working model in a sample of presence university students in order to gain a better understanding of the associations among study variables in different educational contexts. Sixth and last, we could not draw causal conclusions from the present study due to a cross-sectional research design. Thus, there is a need to replicate our working model in a longitudinal research study.

4.4 Conclusion and pedagogical implications

Facebook is one of the influential social media that is widely used among students. Although Facebook usage for socializing purposes may result in negative academic outcomes, Facebook can still be beneficial if it is used for educational purposes. The results of this paper have important contributions to practices of distance education. Apart from Moodle usage as the central learning and teaching platform in the context of distance education, Facebook usage for studying—especially for resource sharing—may help distance students to meet their need for competence in relation to distance study, thereby promoting their academic achievement. Time that students spend on Facebook usage for studying seems not to be supportive of the satisfaction
of students’ basic needs and their academic achievement, but rather in which way they use Facebook for studying.

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**Availability of data and material (data transparency)** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Code availability** Not applicable.

**Declarations**

**Ethics approval** The present study was conducted based on the recommendations and ethical guidelines of the German Psychological Society and the research standards of FernUniversität in Hagen. An ethics approval for the present study was therefore not required. Also, no formal ethic vote was sought due to the non-controversial nature of the study. All student participants were informed that their participation in the online survey would be anonymous and voluntary so that they could quit the online survey whenever they wanted without any disadvantages.

**Consent to participate** Informed consent was obtained from all individual participants included in the study.

**Consent for publication** The present study was a survey research. All student participants were informed that the results of the present study will be published after completion of the project.

**Conflict of interest** The authors declare that they have no conflict of interest.

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