GOING BEHIND THE SCENES AT TEACHER COLLEGES: ONLINE STUDENT KNOWLEDGE SHARING THROUGH SOCIAL NETWORK TECHNOLOGIES

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ABSTRACT

Aim/Purpose	The present study aims to describe existing peer-to-peer, social network-based sharing practices among adult students in teacher colleges.
Background	Ubiquitous social network sites open up a wide array of possibilities for peer-to-peer information and knowledge sharing. College instructors are often unaware of such practices that happen behind the scenes.
Methodology	An interpretative, qualitative research methodology was used. Thirty-seven Israeli students at a teacher college in Israel participated in either focus group discussions of (N = 29) or in-depth interviews (N = 8).
Contribution	Whereas knowledge sharing has been a main focus of research in organizational and information sciences, its relevance to educational settings has thus far been underscored. Recent research shows that peer–to-peer knowledge sharing is widespread among teenage students. The current study extends that work to an adult student population.
Findings	The findings show that knowledge sharing of this type is a common and even central feature of students' college life and study behavior. It takes place through a variety of small and larger social network-based peer groups of different formations, including mostly college students but at time also practicing, experienced teachers. Sharing groups are formed on the spot for short term purposes or are stable, continuous over longer time periods. The contents shared are predominantly lesson summaries, material for exams, reading summaries, and lesson plans. They are used immediately or stored for future use, as

	students have access to vast data bases of stored materials that have been compiled throughout the years by students of previous cohorts. Teacher students mentioned a range of reasons for sharing, and overall regard it very positive. However, some downsides were also acknowledged (i.e., superficial learning, exclusion, attentional overload, and interruptions).
Recommendations for Practitioners	College faculty and teaching staff should be cognizant and informed about these widespread peer-based knowledge sharing practices and consider whether perhaps changes in teaching formats and task assignments are required as a result.
Future Research	Future research should extend this work to other higher education settings, cultures and countries, and should map the perceptions of higher education teaching staff about peer-to-peer, online knowledge sharing.
Keywords	social network technology, knowledge sharing, teacher training

INTRODUCTION

The omnipresence of ubiquitous social network technologies (SNTs), such as Facebook, Twitter, and WhatsApp, have redefined the way in which we share and communicate with our fellow colleages, friends, and family members on a daily basis. The ease and speed with which we can retrieve, share, and re-use knowledge and information with others is incomparable with the reality of only two decades ago. Recent research has started to explore how these technologies have been taken up by both teachers and students for study and learning-related prupuses. In the present work, we report on findings from a qualitative study that show how teacher college students have come to adopt SNT for study-related knowledge sharing. We aim to describe the main features of such practices and to discuss their potential affordances and limitations.

BACKGROUND

Although initially intended for leisure, friendship, and personal interaction, social network technologies (SNTs) have by now crossed over to other fields and are being used for a large variety of different purposes, among which are professional, commercial, and political. Recent research shows that ubiquitous SNTs are also used for study-related, pedagogical, and other educational purposes, both in secondary and post-secondary education (e.g., Asterhan & Bouton, 2017; Hughes, Ko, Lim, & Liu, 2015; Rosenberg & Asterhan, 2017; Waycott, Sheard, Thompson, & Clerehan, 2013; L. T. Yu, 2014). Given the pervasiveness of SNTs in virtually every aspect of everyday life and the fact that teenagers and young adults use ubiquitous SNTs such as Facebook, Twitter, and WhatsApp extensively (Prensky, 2005; Tawiah, Nondzor, & Alhaji, 2014), this should perhaps not be surprising. Much of existing work on educational SNT usage, however, has focused on student-teacher communication with SNT (e.g., Asterhan & Rosenberg, 2015; Bouhnik & Deshen, 2014; Hershkovitz & Forkosh-Baruch, 2013; Ophir, Rosenberg, Asterhan, & Schwarz, 2016; Rosenberg & Asterhan, 2017) and researcher- or instructor-initiated efforts to embed SNT in secondary and tertiary education teaching (e.g., Hrastinski, Edman, Andersson, Kawnine, & Soames, 2014; Keller & Koichu, 2017; Schwarz & Caduri, 2016; Tsovaltzi, Judele, Puhl, & Weinberger, 2015).

In a recent study, we documented a relatively underexposed aspect of SNT usage in education, namely student-initiated organization in SNT peer groups for study-related, academic purposes (Asterhan & Bouton, 2017). It was documented how teenagers have adopted ubiquitous SNTs such as WhatsApp and Facebook to share materials, lesson summaries, advice, and study-related information in school-based peer groups and on a large scale. In the present work, we aim to extend that research to adult students in teacher colleges.

LITERATURE REVIEW

KNOWLEDGE SHARING, SOCIAL NETWORKS TECHNOLOGY AND EDUCATION

Knowledge sharing refers to activities in which individuals share their own internally stored knowledge or external knowledge sources they have at their disposal by making it accessible to others (Asterhan & Bouton, 2017). There are countless examples of online knowledge sharing, such as contributing to an online Wikipedia entry, posting a response to a question on a thematic Q&A forum, uploading a tutorial video to YouTube on how to knit a hat, or posting reading summaries to one's personal blog, to name a few. In the vast majority of cases there is no direct monetary reward involved for making one's knowledge available. Moreover, in contrast to other forms of sharing, knowledge sharing is not a zero-sum game. It involves letting someone else have something that you have, without entailing any kind of material sacrifice on the part of the sharer (John, 2012). In other words, through sharing one's knowledge one does not become "less knowledgeable". Quite to the contrary, when a sufficient number of participants contribute, knowledge sharing leaves one with more (John, 2012, 2013).

Knowledge sharing has been a very popular topic of investigation in informational and in organizational sciences (e.g., Bock, Zmud, Kim, & Lee, 2005; Taylor & Todd, 2001; Wasko & Faraj, 2005; C. P. Yu & Chu, 2007). The vast majority of that research has focused on organizational contexts and sharing between employees (Kankanhalli, Tan, & Wei., 2005; C. P. Yu & Chu, 2007) or in online communities (Lin & Huang, 2013; Lin, Lin, & Huang, 2008). Knowledge sharing is an explicit goal and encouraged in such contexts, as it has substantive benefits for the organization. Findings show two main motivations for individuals to share knowledge in these contexts: Expectations of social rewards for the sharer and expectation to benefit from the many contributions of other participants (e.g., Bock et al., 2005; Davenport & Prusak, 1998; Herzberg, 2003).

In contrast, knowledge sharing is a term that is rarely used in the educational literature. In previous work, Asterhan and Bouton (2017) distinguished between knowledge sharing and other types of peer-led learning interactions more commonly studied in educational research, such as peer cooperation (coordinating work to create a collective product) and peer collaboration (exchanging and building on each other's ideas through shared thinking and discussion) (see also Dillenbourg, 1999). Educational research has almost solely focused on the latter two types and their benefits for learning: cooperation and collaboration in classroom group work activities, that have been initiated, supported and guided by expert teachers (e.g., Hmelo-Silver, Chinn, Chan, & O'Donnell, 2013; Webb, 2009).

Student peer-to-peer knowledge sharing for school-related purposes has, to the best of our knowledge, not received much empirical attention in the educational literature as a topic in and by itself. Existing studies on self-organized, SNT-based peer groups in higher education settings have predominantly focused on the social and psychological function of such communication, rather than on study-related knowledge sharing (e.g., Davis, Deil-Amen, Rios-Aguilar, & Canche, 2012; Hrastinski & Aghaee, 2012; Lotan, 2012; Roblyer, McDaniel, Webb, Herman, & Witty, 2010; Selwyn, 2009; Tess, 2013). Some studies in the organizational and informational sciences have been conducted on knowledge sharing among university students (e.g., Wei, Choy, Chew, & Yen, 2012; Yuen & Majid, 2007). However, these have addressed the topic from an informational science instead of an educational science viewpoint and conflated between knowledge sharing and other forms of peer learning interactions. Furthermore these did not specifically focus on SNT-based knowledge sharing.

In two recent studies, Asterhan and Bouton (Asterhan & Bouton. 2017; Bouton & Asterhan, 2017) explored SNT-based knowledge sharing among secondary school students and found that teenagers self-organize in SNT-based peer groups to share and use shared school-related knowledge materials extensively. Across two survey studies, it was found that the majority of teenagers participate in such online sharing and in general perceive that it helps them achieve better academic results. They then

distinguished between three different categories of SNT sharing for study purposes: 1) sharing teacher-created materials and administrative information, which require little personal investment but which helps the entire group (such as homework reminders, photographs of the whiteboard, and work sheets); 2) sharing learning derivatives and resources that involve considerable personal investment and skill (such as summaries of lectures or reading material summaries or homework solutions); and 3) asking for and providing advice and help through peer direct verbal communication within the social network itself. Sharing of the first and the third type proved to be most frequent, but even the least frequent type of sharing (cheating, i.e., copying individual, solved assignments) proved to be rather frequent, as more than a quarter of the participants admitted to using such materials very frequently.

In the present study, we seek to extend research into SNT-based, peer-to-peer knowledge sharing in formal educational settings to an adult student population, namely teacher trainees in teacher colleges. Our research questions center around the following aspects of knowledge sharing in teacher colleges:

1. How do students self-organize in SNT groups for study-related purposes and what are the characteristics of these groups?

2. What are the types of materials that students share in these SNT, when do they share these, and with whom?

3. What are their motivations for participation or non-participation in sharing through SNT groups?

To complement the existing survey-based findings and to deepen our understanding of the phenomenon, we adopt a qualitative method of investigation to document its dynamics and uncover the interpretations of reality as perceived by the students (Denzin & Lincoln, 2000).

METHOD

PARTICIPANTS

Thirty-seven teacher students from one large teacher training college in central Israel participated in this study. They participated in either semi-structured focus group (2 face–to-face groups of $N = 4$ each, 1 online group, $N = 21$) or one-on-one semi-structured interviews ($N = 8$). The study included students enrolled in a B.Ed. or teacher retraining program (i.e., studens who have a B.A in a non-Education related field and have worked in a different profession before).

Demographic information about the participants in the focus groups and the interviews is presented in Table 1. The focus group and interview participants were selected to represent a large variety of study programs, as well as personal backgrounds (e.g., gender, age, discipline), but all had experience with SNT-based sharing for study purposes. The online focus group consisted of 21 teacher students (2 males) in an online college course on online teaching and the role of teachers in online environments. Most of these ($N = 20$) were enrolled in programs for secondary school teacher training (6 in the humanities and English as a second language, 14 in math and science; 18 in B.Ed.). Forum participation was obligatory in this course and a part of the course assignments.

Participation in F2F focus groups and interviews was voluntarily without receiving material or other compensation. Participants in the F2F focus groups were recommended by the college's faculty members as active participants or leaders of social groups and personally invited to participate. The first F2F focus group consisted of 4 students (1 male), from the English as a second language teacher training program (3 B.Ed. program). The second F2F focus group consisted of 4 female students studying for their B.Ed in primary school teaching programs.

Participants for the personal interviews were recruited from respondents to an online survey on sharing ($N = 487$ in total) (Bar-Tal & Asterhan, 2017), who indicated that they were interested in participating in a subsequent interview and who provided contact details ($N = 22$). E-mails and e-mail reminders were sent to these 22 students to set a date and time for an interview. Eight teacher students responded to these mails and participated in interviews.

Table 1. Personal characteristics of participants in interviews

Alias	Gender	Towards teaching degree	Discipline	Study program
Shibolet	Female	Secondary	Humanities	Retrainee
Calanit	Female	Secondary	Science	Retrainee
Oren	Male	Secondary	English	Retrainee
Marva	Female	Primary	English	B.Ed.
Harduf	Male	Secondary	Mathematics	M.Ed.
Moran	Female	Preschool	Humanities	B.Ed.
Teana	Female	Preschool	Humanities	Retrainee
Ziporen	Female	Primary	Humanities	B.Ed.

TOOLS

A guide to interviews and focus group discussions was constructed (Appendix). Questions were formulated to first address teacher students' usage of SNTs in general. Questions on sharing for academic purposes focused on the following topics: (a) what is shared and when; (b) reasons behind sharing; (c) personal experiences with sharing and SNTs in college; and (d) who does and doesn't share?

PROCEDURE

All the data were collected during the 2015-2016 academic year. The face-to-face focus groups and the interviews (range 80-100 min) were conducted in private, closed rooms on college campus. The online focus group discussion was active for one week and was conducted on Moodle, at the end of an online course. Both the focus groups as well as the interviews were semi-structured. They were conducted as an open conversation with the first author, who probed participants from a list of pre-formulated questions and topics (see the Appendix). The discourse in each session took a different direction and the questions were introduced in different orders and with different emphases, according to the flow of the discussion. The F2F meetings were audiotaped and transcribed in full. The log files of the online discussion were saved. Personal logs were collected by the first author. Since there were no differences between students in the various programs, the data was holistically defined and calculated.

FINDINGS

Using Atlas.ti (7.1) for the thematic content analysis patterns, we analyzed through repeated readings and careful examination of the transcribed protocols (Neuendorf, 2002). Following, a comparison was made between the presence of unique, repeated units (categories) within the data set (Yin,

2008). This procedure yielded a total of 4 main themes, namely, (1) the formation of SNT-based study groups, (2) the type of materials shared, (3) the motivations for sharing, and (4) matters of time in sharing. We present each general theme separately, and provide detailed information and verbatim citations for each main theme below.

Theme 1: SNT group participants - "Tell me who your friend is and I will tell you who you are"

Teacher trainees self-organize in different types of SNT-based groups. These groups differ on a number of dimensions, such as the professional background of group participants and size. As for the first, most groups consisted of teacher trainees only. Some consisted of a mix of teacher students and field professionals from outside the college. The size of self-organized SNT groups also varied. We distinguished between small groups, which consist of two to ten participants, which most commonly "reside" on WhatsApp. Large groups can contain from tens to, in some cases, even thousands of participants, and most commonly reside on Facebook:

> *People open groups like flies.* (laughs) (Oren)

Groups containing only teacher students. The number of participants in small, student-only groups range between two to ten participants. The activity time is flexible and varies according to the aims and offline relationships between the group's participants. For example, some small groups are created for the specific goal of completing a particular assignment. During the course of the assignment the group is very active, but it will be closed upon task completion. In contrast, other small student-only groups are based on offline existing friendships and acquaintances. They are active throughout the semester, or even throughout the full course of study in college and beyond, and are characterized by high participant commitment to one other.

> *All three of us are friends and all three of us are going through the same teacher training, so we share a lot (…). We argue a lot about what we construct, and we have regular courses we study together.* (Shibolet)

> *Our group was set up at the beginning of the first year, and now we have all reached the end of the third year. The group has been active throughout the past three years, during the semesters, during the exams, and even during the vacations between the academic years.* (Nurit)

Larger groups include students studying in the same programme in the same year. It is not always clear who initiated the establishment of the group. It operates for a few years, with students joining and leaving at varying frequencies. These groups contain a tens of teacher students, sometimes even hundreds. They are active throughout the academic year, and in some exceptional cases continue to the following years.

> *First of all, it is very helpful. We have a group… of one hundred and fifty participants on Facebook, which is the entire year, and throughout the year people ask questions. Class cancellations. (…) People upload summaries. I personally upload summaries there to help the other girls. We upload questions before an exam. All kinds of things, the girls helping each other. There is good cooperation there.* (Moran)

The participants' commitment in these groups is low, and the group is constantly "stocked" with new material and information. In addition, they contain a lot of organizational and logistic information, but little personal communication. Interestingly, none of the participants mentioned SNT groups with participants from different teacher colleges.

Groups with in-service teacher participants. Teacher students are also participants of social network groups that include active, in-service teachers. As teacher trainees, they work with in-service teachers in assigned schools as part of their training. To facilitate on-going coordination and communication, trainees are then often temporarily included in existing teacher WhatsApp groups in that school and for the time of the training period.

A rather different type of social network groups that teacher students may be participants of are large, designated Facebook groups for active, in-service teachers. These groups have large numbers of participants, from a few tens to a few hundreds or even thousands and are active over many years. Teacher students can turn to them for professional advice, help, and tips in a range of areas. The students who join such groups feel "small" compared to the experienced teacher "giants" and mainly absorb information or ask for advice, but rarely contribute or share information.

> *I have often encountered a situation with students in the school where I do my teacher training, or I want to receive information about teaching first hand. In such cases, I post a question in Facebook groups dealing with teaching and receive several answers from different teachers, from various areas of the country, with different levels of experience, and different pedagogical and educational approaches. The range of opinions to which I was exposed allowed me to formulate the best position for me, relying on past cases and receiving legitimacy from those with more experience than me.* (Nurit)

Personal acquaintance in such groups is limited, but the group is constantly active. The initiator is often a teacher with experience and authority on the topic, and who usually acts as the group's administrative manager.

> *Then she, Sarit Meller, is the manager of the "Committed Teachers group"… She always responds to everyone… Her entire presence in the group clear, while she is still busy with… still in the area of teaching, I wonder how she finds the time? She is so helpful, finds time to really advise, direct, support, give ideas, she even sends you to all sorts of posts where people talked about the issue before, look here and look there, so she is someone that whenever she, whenever I see her name, I read it, I really appreciate her.* (Marva)

Theme 2: The type of materials shared

Students share study-related materials in all types of format: text in posts, textual documents, voice message, pictures, and videos Content-wise we discern between three type of learning and study materials that are shared: summaries, assignments for submission, and lesson plans.

Summaries. Making and obtaining summaries of learning materials are common activities among teacher students. Many students rely only on prepared summaries that are made and shared by others. Teacher students consider this pattern of sharing as useful for reducing the time devoted to studying. The students who created and shared the summaries may wish to brand themselves and enjoy helping others (see Theme 3).

Participating students mentioned two types of summaries that are commonly shared in SNT groups: lesson summaries and student-made summaries of textual learning materials (e.g., textbooks). Lesson summaries are used extensively, both by teacher students who are absent in class (e.g., for classes for which physical presence is not an official grade component), but also by students who were present in class. Teacher students who share their lesson summaries sometimes get the reputation of good, hardworking students, who write good summaries.

> *Students in the front rows bring laptops from home and type everything the lecturer said. You know in advance that you would want to ask them for their lesson summaries.* (Oren)

In many cases, they are also the initiators who open the groups. Paradoxically, the availability of these "good summaries" online may deter teacher students to attend classes for which attendance is not compulsory, as is shown in the next quote:

> *This makes learning too accessible. It is funny. I don't go to the lesson and I already have the summary before my eyes, I don't even have to go and photocopy it.* (Shibolet)

Sharing of student-made summaries of textual course syllabi items, on the other hand, usually peaks in the days prior to an exam. But in contrast to the lesson summaries, coordinating the obtainment

of all the necessary summaries does not always go smoothly, and the group has to coordinate finding missing contents to complete the puzzle and cover all the material for the exam.

> *We had someone in the group who found it and wrote to the group: girls, I'm the "savior", I have found the summaries… and that day she sent everyone all the summaries and for two days before the exam we sat with these summaries.* (Seora)

In this case, much of the activity is within the small groups, but the participants keep in touch with equivalent groups that might have obtained the missing material. They share with everyone, both the participants of the personal group and other groups of students taking the same course.

> *Here is Dr. Levy's exam. She wrote it on the board and I photographed it and sent it to the large group, not just to our group, I sent it directly to the large group.* (Shoshana)

In some cases, especially in smaller groups, the group participants distribute the materials amongst themselves and each participant is responsible for summarizing a particular part of the syllabus until a pre-set deadline. Each participant shares his/her summary on time and thus all participants obtain a complete set of summaries in the end. Anonymous sharing, where the identity of the original person who created the summary is unknown, is more common in large groups that accompany introductory or obligatory courses. Each syllabus item has one or more summaries which are uploaded to a repository and shared in both small, intimate or larger groups (see also Theme 4). In all the summary sharing patterns, the student who feels like the "responsible adult" usually provides the summaries and/or organizes the learners, and is the initiator of the group.

Assignments. Teacher students are required to prepare and submit individual assignments autonomously. Due to the ease with which teacher students can share each others' work through social network sites, however, they collect information from friends and share examples of similar assignments.

> *For personal assignments, I ask people to get an impression of how much they have written. If there is someone whose writing, I appreciate… I ask to see what he did because it helps me formulate the idea, not necessarily at the copying level, it just helps you get the overall order, and get the direction.* (Harduf)

In another pattern of sharing, students prepare the individual assignment independently, but before submitting it to the lecturer, ask friends to read it and comment:

> *In our group, two people asked me for an opinion and I gave an opinion. Just girls who ask.* (Zufit)

In the case of group assignments, teacher students make extensive use of SNT groups and tools, both for coordinating task distribution as well as for completing the task itself. This can be achieved in a an egalitarian matter, according to which each student equally contributes, has an equal say, and group members are collaboratively in charge of the final, assembled assignment in its entirety.

> *We discuss on WhatsApp who will do each part, what we write in each part, and we also talk over Skype conference calls, and one of us writes it down, someone types in Google Docs. Each of us puts her part into Google Docs.* (Shibolet)

In other cases, the group appoints a temporary or permanent leader for such assignments. The leader is responsible for planning, schedule, receiving materials, and sharing them among the participants, and editing all the materials to create the complete assignment.

> *She organizes things and if she sees an update she says: girls, there is such and such work, let's get organized and do it. She is the thinking head of our group.* (Seora)

Students share a lot of materials, but there is actually only one student who reads and edits the entire assignment before it is submitted.. The rest of the teacher students in the group only know the particular piece of information each of them prepared individually. This process of sharing, places them in a position of minor participation in a larger assignment. The protocols showed that this structure of distributed and fragmented group work is more frequent.

In advance, I don't go over the parts of the others, only if I don't trust them, but there is the dominant person who checks all the parts. (Shibolet)

The initiative to open a group for one assignment usually comes from one active student who enjoys organizing and planning everything in advance. In contrast, groups that are active over time are usually initiated naturally as a result of the friendship between teacher students, and serve for a wide range of issues, contents, and types of sharing.

Preparing Lesson Plans. Trainees spend one day a week in practical training in a school or kindergarten. They observe classes and participate in teaching. For this purpose, they are required to prepare written lesson plans that are submitted to their pedagogical mentor a few days prior. Lesson plan development usually entails a back and forth of dialogue and exchange of improved drafts with the mentor. With the help of SNT, however, there are several shortcuts:

We have a folder of lesson plans. Whenever someone teaches a lesson she shares the plan to the folder. This is excellent, because we do not always have time to construct a lesson plan and a detailed presentation, so we use each other's materials. But nothing compares to writing the lesson plan and preparing the presentation yourself, because that way you understand things much better… But the learning is not so deep when we have the material available. (Havazelet)

Teacher students who are participants of larger Facebook groups with active teachers gather full or partial lesson plans from these groups, or they collect a few and create their own lesson plan. Based on the interview and focus group data, it appears then that the pedagogical mentor, who used to closely monitor, supervise, and support students ' lesson plans construction, has now become the last person in the chain, receiving finalized lesson plans that do not necessarily reflect the student's individual ability to create a lesson plan. Furthermore, teacher students sometimes receive support and advice from other practicing teachers who they meet online and who share their material and professional knowledge as "tribe elders".

It is very efficient and helpful for building lesson plans. There is no limit to the ideas and suggestions people give. We are exposed to very creative things that we would probably not have thought of ourselves (…) and we can learn from the experience of others. (Rakefet)

Theme 3: Motivations for sharing and not sharing

We distinguish between motivations in favor and against sharing, and present them in separate subsections.

Motivations in favor of sharing.

Three main motivation categories in favor of participation in peer-to-peer sharing were detected in the data corpus: social gains, academic gains, and logistic gains.

Social gains. Social gains refer to actual and expected gains that improve the social standing and/or the social relationships of the sharer or the receiver of the shared information. One type of social gain that was mentioned by the participants in this study is self-branding, that is, the sharer brands himself as knowledgeable, as an object of admiration, and as a person whose company is desirable. Frequent sharers report an increase in their self-image and their social status in their online groups and their real-life friends.

We had a very, very big annual exam in… I shared summaries… and one very large summary with all… Many people said thank you, thank you, this was very helpful in the exam. I felt a great sense of satisfaction. (Moran)

The atmosphere in teacher training colleges in Israel is generally collaborative and void of competition for external rewards (such as, scholarships based on academic merit, awards of excellence). Teacher students perceived that helping others does not detract from the helper's chances of succeeding.

> *People share and are not pressured because we don't have a Dean's Excellence Scholarship here, as we did in my bachelor degree studies at University, where only one out of the entire group wins.* (Calanit)

Some also mentioned the expectation that the act of sharing in the present will lead to future benefits, when the act will be reciprocated by the persons who benefitted from it (quid pro quo).

Academic gains. The act of sharing and making the materials accessible to others requires the learner to organize his thinking, summarize, and organize the study material and knowledge, so that it will be accessible and clear to others. The recipient of the material and knowledge receives organized, tidy products that they feel help them in achieving better results.

> *I saved everything from all the years, I have actual folders from the first year.* (Marva)

The student's ability to prepare a paper, to write fluently, or to solve a mathematical problem is sometimes limited, but with the help of colleagues, each one contributes a part and together, as a group, they are able to produce a better end product than if each learner would have handled the issue or solution alone.

> *My grades… are very high, and I have to note that a large proportion of this positive result should be attributed to the people in my WhatsApp group.* (Lilach)

Finally, some mentioned that it opens up opportunities for learning new materials that are not part of any particular course. This was mentioned only with regard to large online groups that include experienced, in-service teachers. In such groups, the students are exposed to a range of topics, fields, and information sources.

Logistic gains. Sharing saves time, which is one of the most valuable resources in the 21st century. Teacher students do not need to think, prepare, plan, know, learn, photocopy, and write on their own. Sharing frees them from some of these tasks and frees up valuable time for other things.

> *Instead of searching for the answer on the Internet and studying the subject, I get the answer right away and use it immediately.* (Havazelet)

The down-sides of SNT-based sharing.
Teacher students also mentioned reasons to refuse participation in sharing practices and negative side effects of sharing.

Reasons for refusing to share or to partake in sharing. Some teacher students mentioned that whereas they contribute to sharing (either of their own initiative or at the group's request), they abstain from using materials shared by others. They then choose to not benefit from the "crop" of materials and information of joint sharing.

> *I like to rely only on myself. I have no problem providing an opinion to others.* (Bosmat)

Some mentioned that they or others choose not to share materials with specific students. Several reasons were mentioned: Fear of cheating and copying, unwillingness to share a complete solution to those who were not involved throughout the process, feelings of exploitation (especially with larger assignments that require more effort), lack of personal acquaintance with the person who requested the materials, and a personal disliking of a particular individual.

> *I made my effort to get it, so that's your problem… I don't have to make their lives easier… This sense of exploitation.* (Seora)

Finally, participants also mentioned instances of punishing defunct group participants, especially the ones who only lurk and do not "contributing sufficiently". The common way to deal with this issue is to open a new group without that person and without his/her knowing.

> *There was someone I had to chase and by the time the day of the exam arrived I was lacking some part for the exam, so we opened a new group without her.* (Zufit)

The ostracized student may notice that the group has gone quiet, but may not be aware that his/her peers continue their activities elsewhere without him/her, as no one has officially left the first group. He or she may then not know, at least for some time, of his/her ostracized status and loss of all the sharing benefits.

Sharing pains: Negative side effects of sharing. Sharing may sometimes come at a price. First, the incessant stream of messages can cause pressure and anxiety for certain students as a results of social exclusion or of social comparison.

> *In one of the assignments the girls talked a lot on WhatsApp and a situation arose where you and I were not in the conversation and we felt like outsiders, which caused us misunderstanding, confusion, and pressure that everyone knew the course material… and we didn't.* (Sigalit)

Oversharing and an overload of messages can also create interference with ongoing study tasks and concentration. Some students mentioned this as a reason for leaving a group, especially when the message were mainly off-topic.

> *It [the phone] is sometimes a burden. There was a day when I just silenced the group. Once every hour I went in to check, but every minute was too much.* (Calanit)

The opportunity to divide group task into smaller tasks that are distributed among group participants may also have potential negative effects for individual intellectual progress. When each individual only prepares one particular subset of the total task or reading and relies on others to do the remainder for him/her, important learning and development opportunities are missed. The same is true for finding ready-made solutions available on one's social network, as is clear from the next two quotes:

> *The fact that it's all so accessible causes our imagination and our thinking about difficult subjects to atrophy, because we just run to the quick answers on various networks.* (Rakefet)

> *It sometimes limits imagination and creativity: (…) we instantly see someone else's answer before answering ourselves, and this may dictate our own thought pattern.* (Nurit)

Theme 4: Matters of time in sharing

Continuity and immediacy. Most participants reported ongoing, continuous activity in the WhatsApp groups, throughout the day.

> *From the early morning, there is talk and talk and talk and talk.* (Yearit)

However, they also mention going offline regularly and/or regulate the reception of postings in ways that allow them to function without constant interruptions:

> *The groups themselves are all on silent for me (…). When I am free and want to, I look at the telephone and see how many messages I have. I choose which messages to respond to and which not.* (Oren)

Group activity peaks in breaks and around deadlines. The materials may be gathered continuously throughout the semester, but toward the end of the semester, as the exam or course assignment due date approaches, sharing frequency becomes very intensive, with people sharing many lesson summaries, photographed material, article summaries, and so on.

> *Like now, at the end of the semester (…). Not everyone reads the articles. Someone reads and shares with us on WhatsApp what the article is about (…) and it happens in every assignment, it's not some special event.* (Erez)

Based on the student reports, response to requests for sharing are quite fast, particularly in WhatsApp groups. When there is a problem, a difficulty, or a question, an immediate response is usually posted by at least one of the participants, with either a picture, a written reply, or a summary.

Building data bases for future use. Some feel responsible to contribute to the construction of a communal online learning material database, which is passed on to the next generation of teacher

students in the year or semester following. Usually one particularly involved student initiates and leads such an effort, while others follow suit. Regarding themselves as senior supporters of incoming teacher students, they collect the suitable course-related materials in a dedicated folder, usually situated on Google Drive.

> *There are girls who took a certain course now and others will take it in the second semester… We pass materials and essays.* (Dikla)

> *Assignments and pages in these groups without the lecturers, anything I think could help other girls, I just send, whether it's the material I summarize, articles I think, anything that could help. For example, summaries I made, I send them so if they have the course now in the second semester they will already know and have the materials.* (Avivit)

Exam item databases are built as well. The preparation, management, organization of the sharers, and the schedule are conducted with military precision, as is evident in the next quote:

> *We now have a procedure, as soon as an exam is over everyone writes the questions she remembers from the exam… and we give this to those who have not yet taken the course.* (Bosmat)

A few highly motivated students also construct databases for their own future use. This is particularly true for lesson plan and other teaching materials that may come in handy when being an active teacher in the future. Teacher materials, lesson plans, and such are collected and stored in the communal cloud on Google Drive.

> *We share with each other the lesson plans that teachers in the school prepared, and then I have a place on my phone with cool ideas for lesson plans, for example, of the teacher I'm observing, or in private lessons, or I do something cool, or I have index cards… I photograph the cards… then I tell the group right away and they save this for themselves.* (Shoshana)

DISCUSSION
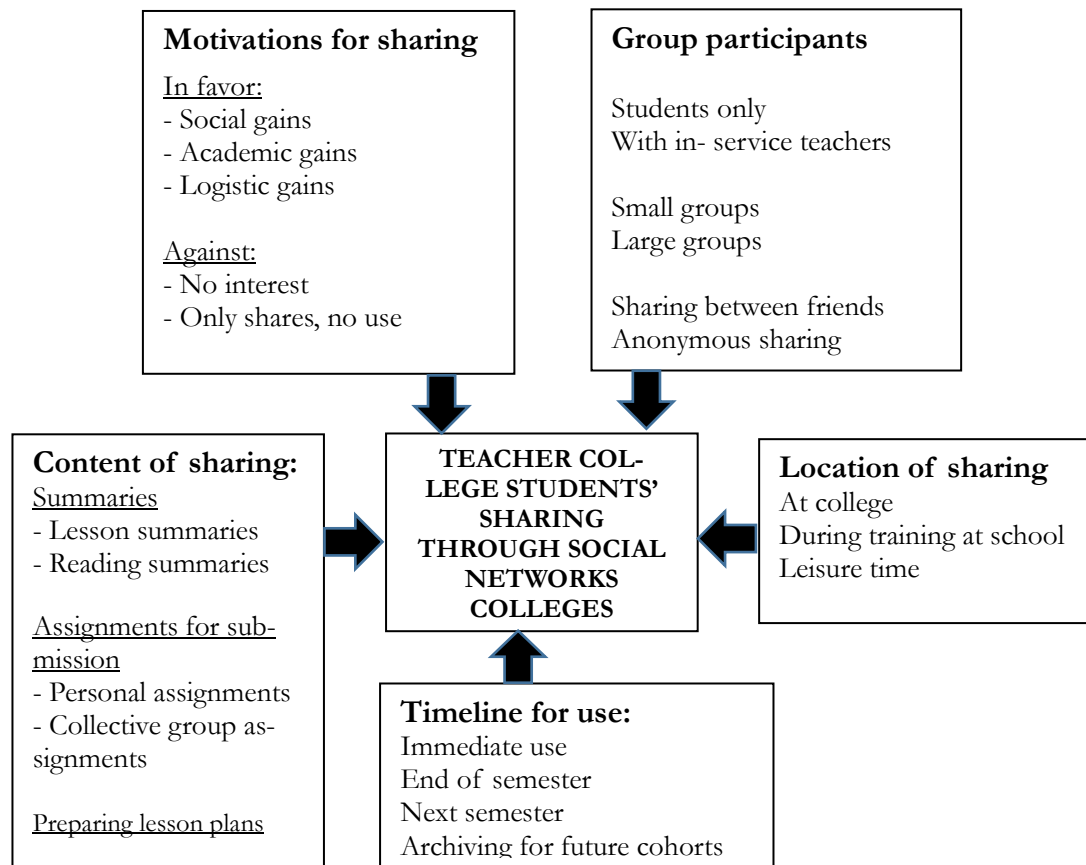
In the present study, we explored and described the phenomenon of SNT-based, peer-directed knowledge sharing for study purposes among adult teacher college students. In alignment with recent findings from teenage, secondary school populations (Asterhan & Bouton, 2017), we found that knowledge sharing of this type is a common and even central feature of college life and study behavior. The main features of these sharing practices are summarized in Figure 1. Our findings show that study-related, online knowledge sharing among teacher trainees takes place in (1) small groups of intimate study friends, (2) small-scale, temporary collaborations on a particular class assignment (usually on WhatsApp), or (3) in very large Facebook groups that span a whole cohort, several cohorts or even practicing teachers. The main contents shared are lesson summaries, material for exams, compulsory reading summaries, and lesson plans. They are used immediately, at the end of the semester, and/or stored for future use (i.e., professional use in future or for the next cohort of college students). SNT-based knowledge and material sharing is overall regarded very positively by teacher college students, but they also recognized some of its downsides (i.e., more superficial learning, exclusion, attentional overload, and interruptions). Teacher students mentioned a range of reasons for sharing that are personal, study-related, and logistic-organizational.

Our data indicate that the prominence of knowledge sharing in everyday study behavior, the motivations behind sharing and the contents of sharing materials among students align to a large extent with previous studies (Asterhan & Bouton, 2017; Hrastinski & Aghaee, 2012; Hughes et al., 2015). We found sharing categories somewhat similar to the ones in Hrastinski and Aghaee's higher education sample (2012), but, in contrast, found that knowledge sharing is pervasive rather than sporadic. Moreover, the qualitative, in-depth approach we adopted here also uncovered several new insights that may be more particular to higher education and/or to teacher colleges.

The characteristic of higher education students' sharing practices documented here may have several implications for the field. College faculty and teaching staff should at the very least be cognizant about this widespread peer-based knowledge sharing and consider whether changes in teaching formats and task assignments are perhaps required in light of it. For example, the easy availability and the sheer volume of study materials and lesson summaries on SNTs may render class attendance unnecessary in the eyes of students, since they receive lesson summaries before the lesson (in courses that are similar every year), at the end of the lesson, or at the end of the semester. This pattern requires policy makers to reconsider and decide whether to continue the policy of non-compulsory attendance or, alternatively, to change the character, type, and managing of face-to-face classes.

Figure 1. Main features of SNT-based knowledge sharing for study purposes among teacher trainees at a teacher college

Motivations for sharing

In favor:
- Social gains
- Academic gains
- Logistic gains

Against:
- No interest
- Only shares, no use

Group participants

Students only
With in- service teachers

Small groups
Large groups

Sharing between friends
Anonymous sharing

Content of sharing:
Summaries
- Lesson summaries
- Reading summaries

Assignments for submission
- Personal assignments
- Collective group assignments

Preparing lesson plans

TEACHER COLLEGE STUDENTS' SHARING THROUGH SOCIAL NETWORKS COLLEGES

Location of sharing
At college
During training at school
Leisure time

Timeline for use:
Immediate use
End of semester
Next semester
Archiving for future cohorts

The findings about the changing role of the pedagogical mentor reported here are particularly relevant to teacher colleges. Traditionally, the pedagogical mentor is to provide support for the progress and construction of lesson plans and functions as the mediator between theory and practice (e.g., Anderson & Shanon, 1988; De Jong, Korthagen, & Wubbels, 1996; Rodgers, 2002). However, our findings show that the pedagogical mentor is now often the last person in the chain and receives a complete lesson plan instead of playing an active role in the process of lesson plan building. It seems that this work has been replaced by copying existing lesson plans that are available online, in the worst case, and/or by the guidance of practicing teachers who share their materials and professional knowledge as "tribe elders", at best. The finding that -at least some- students consult with practicing expert teachers and online teacher communities should be considered in a positive light. However, we note that we could not discern the frequency and prevalence of such expert consultation and whether this concerns in-depth interactions or, instead, merely the copying of materials that are made available through the online Facebook community of teachers. It has become much easier, and

thus perhaps more frequent, to directly approach them online or to "lurk" as noncontributing, observing novices when the experts converse among themselves in Facebook groups, for example. Future research should further explore these interactions.

Knowledge about these pervasive knowledge sharing practices amongst students may also elicit a rethinking about individual and group task assignments during or at the end of a course. Based on our conversations with students reported here, students rarely read the primary original sources in the syllabus, but instead rely on (several) student-prepared summaries and other secondary sources. As for task assignments that are to be submitted to instructors during or at the end of a course, even excelling teacher students were found to consult and examine other people's work before performing the task by themselves. At least in some cases, students reported sharing their work with peers for feedback and review. Others may compile a mix of excerpts from different completed assignments available with minimal cognitive investment. Some of these aspects are expected to promote learning and development (such as peer review and peer consultation), whereas others are contradictory to the goals and intent of the instructors (such as copying). As for the group assignments, according to the students who participated in this study, there is often no brainstorming or "genuine" peer collaboration of high quality (e.g., Dillenbourg, 1999; Hmelo-Silver et al., 2013; Webb, 2009). Instead, each person prepares a small part of the assignment and only the group leader reads the entire assignment, takes responsibility, does quality control and (presumably) enriches his/her knowledge. Therefore, teacher students should consider whether they really benefit from SNTs in their learning process and outcome.

CONCLUSION

Even though ubiquitous SNTs were originally designed for social purposes, the present findings add to recent research showing that students have domesticated these tools for self-organized school- and study-related purposes as well, in particular to share learning and study materials. These sharing practices appear to be very pervasive and common, both in high school and in college settings, and have therefore accumulated in a substantive change in study practices over the last years. It becomes increasingly important that teaching staff become aware of these changes so that they reflect upon and adapt their teaching routines accordingly, should they deem this necessary. As a follow-up to this research, we have conducted several interviews with college instructors to understand what they know about online peer sharing in SNTs. It was very difficult to find interviewees, as most candidates claimed that they had no knowledge of this phenomenon at all. This difficulty underscores the importance and contribution of the present study that aimed to portray and describe existing practices and shifts in students' study practices. Social media research should dedicate more attention to the non-social puproses for which users use social network technology, such as study.

ACKNOWLEGEMENTS

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APPENDIX

1. Which social networks are participants of?
2. Why are you part of social networks?
3. What do you share there?
4. Why do you share?
5. What do you expect others to share with you?
6. Who are the people who share the most?
7. How are they different from one another?
8. Who are the most active participants and who the least active participants. Why?
9. How much time is allocated to the social aspect and how much to the academic aspect?
10. How do you use the social network for learning?
11. Tell me of an experience which is related to social networks, that you had in college.
12. Is there a difference in the scholarly use of the social networks?
13. What is the difference in your scholarly us of the social networks?
14. Does every course have its own group in a social network or do you have one group in a social network for all (the subject matters or courses?
15. Is the entire class or all the interns in one group? Which is more common?
16. Is the lecture or the pedagogical instructor also part of the group in the social network?
17. Who are the participants? Everyone who enrolls the course?
18. Who are the silent participants, why?
19. Who doesn't share and why?
20. Who was left out and does not share or have friends in social networks?
21. Who are the ones who quit?
22. Who is admired and who isn't?
23. Is the membership in the networks according to some criteria (Jew, Arabs Russians, and the age of the Teacher students)?
24. When you applying for a large group and small group? When it was part of a large group there and what are you doing differently?
25. Are there times that more or less all network activities and unique network in particular?
26. What bothers you the social networks on the subject of learning?
27. Does it hurt or bother getting five lesson plans and you don't know what to do?
28. Are you using social networks or processes try looking for solutions that are ready, ready to work, lesson plans ready?
29. Have you ever whose applications have not been answered? What this has done to you?

BIOGRAPHIES

Dr. Smadar Bar-Tal is a lecturer and staff member of the Center for Innovation and Excellence at the Levinsky Teacher College, Israel. She served as head of the high-school teacher training program at Levinsky College and as head of department of Online teaching environments at the Mofet Institute. She is a researcher and curriculum designer of technology-mediated teaching and learning, focusing particularly online discussions and social networks. Smadar teaches courses on digital pedagogy and leads online workshops for novice teachers.

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