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Title: Lessons learned on student engagement from the nature of pervasive socio-digital interests and related network participation of adolescents

Year: 2021

Version: Published version

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Please cite the original version:

Kruskopf, M., Hakkarainen, K., Li, S., & Lonka, K. (2021). Lessons learned on student engagement from the nature of pervasive socio-digital interests and related network participation of adolescents. *Journal of Computer Assisted Learning*, 37(2), 521-541.
<https://doi.org/10.1111/jcal.12506>



Lessons learned on student engagement from the nature of pervasive socio-digital interests and related network participation of adolescents

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Funding information

Academy of Finland, Grant/Award Numbers: 312527, 327242; Opetus- ja Kulttuuriministeriö, Grant/Award Number: 6605844

Abstract

The rise of modern socio-digital technologies has fundamentally changed the everyday environments in which young people communicate with each other and cultivate interests. To gain a more sophisticated understanding of this phenomenon, this study provides in-depth, qualitative insights into adolescents' experiences of their socio-digital developmental ecologies. The 15 interview participants were recruited based on a previously conducted questionnaire. The semi-structured theme interview addressed the socio-digital aspects of the participants' interest-driven behaviours and related networks with the aid of participant-generated egocentric maps. The data not only qualitatively enrich the picture on adolescents' friendship- and interest-driven socio-digital participation but also provide new perspectives on the phenomena through the added network-layer of analysis. The youth seem to vary in their motivational profiles related to their participation and the potential relevant psychological background factors for this variation are considered. Educational implications of these results are discussed when it comes to effective student engagement and connected learning.

KEYWORDS

connected learning, digital engagement, egocentric networks, interest, pervasive technology, socio-digital participation

1 | INTRODUCTION

The exponential rise of ubiquitous digital technology has fundamentally changed the ways people interact with each other and cultivate interests in their markedly expanded everyday social platforms and networks (Castells, 2001). The ecology of the youth development has transformed with the developmental micro- and macrosystems (Bronfenbrenner, 1996) both present in their proximal interactions through internet-connected devices, which are ubiquitously available, also in the classroom (Ito et al., 2013; Nardi & O'Day, 2000; Prensky, 2001). On the one hand, teachers have more and more

difficulties in engaging their students with their traditional teacher-centred and reproductive instructional practices (Entwistle & Ramsden, 2015). On the other hand, active socio-digital participators appear to feel alienated at school, especially related to lack of social and active participation (Hakkarainen, Hietajärvi, Alho, Lonka, & Salmela-Aro, 2015; Hietajärvi, Lonka, Hakkarainen, Alho, & Salmela-Aro, 2020).

Many teachers, parents and researchers worry that super-intensive digital participation, sometimes addictive in nature (Kuss, Shorter, van Rooij, Griffiths, & Schoenmakers, 2014), endangers students' wellbeing, schoolwork and harmonious development (i.e., Twenge, 2017, 2018). Nevertheless, the socio-digital tools used

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by young people not only merely cause distraction, but also provide powerful affordances for connected learning (Ito et al., 2020). This happens through online communities that transcend time and space, networks and tools and that the students engage within informal, out-of-school contexts in a self-directed and inherently motivated manner (Gee, 2005; Gee & Hayes, 2012). Thus, a unidimensional discussion concerning how much young people spend time online, that is, their “screen time” appear biased without considering variation in the nature of concrete, enacted, socio-digital activities and participants' developmental history of cognitive socialization (Bell, Bishop, & Przybylski, 2015; Hietajärvi, Salmela-Aro, Tuominen, Hakkarainen, & Lonka, 2019; Kennedy, Judd, Dalgarno, & Waycott, 2010). There are no reasons to assume that digital engagement would have mainly negative developmental consequences (e.g., Coyne, Padilla-Walker, Holmgren, & Stockdale, 2018; Twenge, 2017, 2018), as indicated by a recent large-scale meta-analysis by Orben and Przybylski (2019).

In the present study, young people's social activity mediated through diverse digital devices, platforms and the internet is referred to by the concept of *socio-digital participation* (SDP, see Hakkarainen et al., 2015). It is a common phenomenon for most of us to be “always on” (Baron, 2008), so to speak, in our wide socio-digital networks through our devices that enable new forms of microblogging (Java, Song, Finin, & Tseng, 2007), photo capturing and click-based preference systems (Baron, 2008; Ito et al., 2009; Lenhart et al., 2008; Rainie & Wellman, 2012). Digital gaming is also an increasingly pervasive part of modern culture (i.e., Gee & Hayes, 2012; Mäyrä, 2007) providing ample opportunities for personal and social engagement, learning and self-expression. Ito et al. (2009) found that young people tend to participate in their digital media ecologies in friendship- and interest-driven ways; the former involves digitally extended hanging out in the immediate network of peers whereas the latter involves using socio-digital technologies for pursuing activities, interests or niche and marginal identities rather than friendships per se. In the development of their model, Ito and her colleagues were influenced by the four-phase model of interest development by Hidi, Renninger, and Krapp (2004).

1.1 | Developing long-term personal interest and intrinsic motivation

The so-called “person-object theory of interest” (POI; Krapp, 2002; Schiefele, Krapp, Prenzel, Heiland, & Kasten, 1983) describes interest as the relation between an individual and their environment. Interest can be seen as a specific part of the long-term neural network pattern of the individual acquired through habituation (Renninger, 1990, 1992, 2000). Through attentional and motivational processes, any situational representation (Hidi et al., 2004) in this network can then potentially become the object of an individual's interest (Krapp, 2002; Schacter, Addis, & Buckner, 2007). The four-phase model proposed by Hidi et al. (2004) includes the phases: (a) triggered situational interest, (b) maintained situational interest, (c) emerging (less-developed) personal/individual interest and (d) well-developed personal interest. In the first two phases of this recursive model of cultural participation, the interest is initiated by (socio-digitally mediated) cultural

experiences of activating and challenging previous mental models. Across the last two phases, the interest develops further until sustained interests and associated advanced digital competences, have emerged (Renninger, Hidi, & Krapp, 2014).

A distinction should be made between the so-called actual-genetic and ontogenetic level of interest (Akkerman & Bakker, 2019; Krapp, 2002). As the former relates to the emergence of a “working interest” in an actual situation, the latter describes the more long-term habitual dispositions towards certain objects in an individual's environment.

There are two typical levels of analysis for the concept of “interest.” First, interest can be analysed by the structure of the individual's relatively stable tendency to occupy with an object of interest, the “personal” or “individual interest” (Renninger, 1990, 1992). On the second level, interest as the above-described person-object-level relation (POI) can best be described as “being interested” (Hidi, 2000). This particular study concerns primarily the former, and focuses on the *intensive and digitally pervasive, long-term personal/individual interests* of adolescents that have already been somewhat stabilized from an ontogenetic point of view.

High *value-related* and *feeling-related* valences are characteristic of the well-developed personal interests (Damasio, 1996; Krapp, 1993; Schiefele, 1991, 1999, 2001). While the former are important for the person's sense of self and self-intentionality (i.e., the personal significance) the latter constitute of the positive academic (Pekrun, Goetz, Titz, & Perry, 2002) and other emotions (i.e., Ekman, Dalglish, & Power, 1999) related to the interest-related activity. When these two are in harmony with the current object of interest, the individual reaches a state of *intrinsic motivation* (Deci & Ryan, 2010) characteristic of interest-based processes (Krapp, 2002). “Intrinsic” refers to the activity being motivating as such, where there is no gap between what the individual is required to do and what they would most prefer to do in a given situation (Krapp, 2002). For instance, in school-related activities the basic psychological needs of autonomy, competence, relatedness and sense of contribution are necessarily not fulfilled and such a gap may be experienced (Eccles, Brown, & Templeton, 2008; Ryan & Deci, 2000). In the optimal state of intrinsic interest, when also the experienced challenge- and skill-levels are in balance, even flow can be reported (Csikszentmihalyi, 1988). Interest is an important factor also in the context of expectancy-value-theory (Wigfield, Tonks, & Eccles, 2004) and thus in determining the sustainable life course of individuals when it comes to their education and career choices (Akkerman & Bakker, 2019).

1.2 | Context of interest development in socio-digital networks

As mentioned above, the total ecology of adolescents' development (Bronfenbrenner, 1996), including their personal interest development, is rapidly and conspicuously transforming through the recent technological advances. The developmental micro- as well as macro-systems or realms of the individual adolescent (schools, neighbourhoods, parents' work places etc.) are all increasingly blended (Bonk & Graham, 2012; Graham, 2006) and thus present in the physical as well as, ubiquitously, in the digital space, wherever they might go (Ito

et al., 2013; Nardi & O'Day, 2000; Prensky, 2001). As a result, also the traditional boundaries between these realms are crossed more frequently and ubiquitously (Akkerman & Bakker, 2011; Engeström, Engeström, & Kärkkäinen, 1995) if not almost blurred out. In fact, Ito et al. (2020) have proposed that the concept of “transfer” of school knowledge to practical context (Perkins & Salomon, 1992) be replaced by “connected learning” factually happening within these ubiquitous practical contexts and influencing them, which the modern technology already enables.

Different virtual environments offer multiple opportunities for immersion (Mania & Chalmers, 2001) and to try out different identities in the form of games and creative self-expression (i.e., Mäyrä, 2007). So-called “communities of practice” (Brown, Collins, & Duguid, 1989; Lave & Wenger, 1991; Wenger, White, & Smith, 2009) refer to groups of individuals organized around an interest or skill with a shared goal of either mere participation or knowledge creation and skill development (Hakkarainen, Paavola, & Lipponen, 2004; Hakkarainen, Palonen, Paavola, & Lehtinen, 2004). Such communities have been discovered to spontaneously emerge in young people's interest-driven online communities. Further, Gee and Hayes (2012) have named the communities of practice in the online context as “affinity spaces,” to differentiate the emerging passionate interest groups from the connotations of stable communities with fixed group memberships and rigid roles of participation (Gee, 2005). These online sites, centred on, for example, certain computer games or the pursuit of media production (e.g., fanfiction), offer powerful support for informal learning (Greenhow & Robelia, 2009). Informal socio-digital participation provides a multitude of opportunities for interest-driven activities that involve pursuing collaborative efforts of working with shared objects of activity (Akkerman & Bakker, 2011; Paavola & Hakkarainen, 2005, 2014). These creative activities may focus on various objects from media productions to tinkering with technology (e.g., coding and robotics) or involve socio-political activism (Jenkins, 2016).

The sociometric status of a child in their immediate peer network has far-reaching consequences for the development their social cognition and aspects such as empathy, aggression and social problem solving strategies (Eronen & Nurmi, 2001; Newcomb, Bukowski, & Pattee, 1993; Salmivalli, Kaukiainen, & Lagerspetz, 2000; Warden & Mackinnon, 2003). In our day and age, our *socio-digital networks* (Li, 2019) are as portable and blended as the smart devices that we carry in our pockets. The different forms of digital engagement in these networks are increasingly pervasive in our everyday lives, which, one would assume, presents new challenges for the traditional sociometric methodology based on naming relations within school. Within the affinity spaces, group memberships and identifications as well as the stability in these present somewhat different sorts of dynamics than in the realm of face-to-face interaction although not necessarily in their personal significance for individuals (Gee & Hayes, 2012).

1.3 | Call for qualitative research on the socio-digital in interests and networks

Research on the spontaneously cultivated, thoroughly pervasive, personal socio-digital interests of the youth is critical for better harnessing the potential learning benefits of the rapidly expanding

socio-digital technologies at school (Hakkarainen et al., 2015; Hietajärvi, 2019; Lonka, 2018). Teachers and schools need to engage young people in creative use of socio-digital technologies to inspire their learning and motivation, as well as develop important future skills (Lonka, 2018; OECD, 2019).

Many investigations have centred on collecting extensive quantitative data regarding young people's socio-digital participation (SDP, for example, Hietajärvi, 2019; Li et al., 2017). However, because young people's socio-digital practices are rapidly changing, there is an urgent need for in-depth, qualitative research based insights into what the different forms of interest-driven SDP actually mean in the totality of the lives of individuals (Bennett & Maton, 2010; Ito et al., 2010; Li et al., 2017; Ito et al., 2009). The present study intends to offer new insights concerning adolescents' personal experiences of their SDP as well as their passionate interest affinity spaces and their function, and sheds more light on modern adolescents' socio-digital interests, networks and self-perceived pervasiveness of their use of socio-digital technologies.

In previous studies by Ito et al., 2009–2020, based on extensive ethnography, the following *genres of participation* have emerged that depict the differing levels of intensity in adolescents' SDP. First, *hanging out* refers to SDP oriented towards *friendship-driven* networking in social media complementing the modality of face-to-face networking (Ito et al., 2009, 2010). Second, *messing out* refers to more media- or technology-centric, *interest-driven* engagement and increased amount of tinkering, exploring and extending understanding through, that is, experimenting with personal media production. Third, *geeking out* represents the sort of highly acclaimed expertise and highly intensive digital engagement in an individual subject area of interest that extends enough to bend or break social and technological rules. These genres are, naturally, not mutually exclusive and while all of the adolescents might engage in hanging out—types of behaviours, the interest-driven forms of participation are more scarce. Using these established genres as basis, the main purpose of the present study was to examine qualitative experiences of young people in relation to the digital aspects of their intensive personal interests, the related networks and the pervasiveness of their technology use (Bennett & Maton, 2010; Gee & Hayes, 2012; Lakkala, 2010; Paavola & Hakkarainen, 2005, 2014). The research questions of the present study thus were:

1. How do the different participants describe their (personal) interests and the related socio-digital participation (SDP)?
2. What kinds of similarities and differences emerge from the different individuals' experiences of using socio-digital technologies for friendship- and interest-driven genres of participation and networking?
3. How do the participants reflect on the pervasiveness of their ubiquitous socio-digital participation inside and outside school?

2 | METHODS

2.1 | Participants and their selection

The participants of the present interview study were 15 (8 female, 6 male, 1 unknown) second-year students of a multicultural

teacher-training high school at the southern part of Finland; the school includes a regular high school program as well as an International Baccalaureate (IB) program. Thus, a part of the students might attend the school from outside the particular suburb in which the school was located. Being subject to teacher trainees, the students' parents had already granted permission for participating in scientific investigations when beginning their education at the institution. The participants of teacher training high schools in Finland are generally a homogenous group regarding factors such as socio-economic background, study success and subject specialization.

2.2 | Selecting the participants of the interview

The participants of the study were selected based on the intensity of their self-reported primary interest on a questionnaire filled half-a-year before this study's interviews. On the questionnaire, which consisted of quantitative measures and individual open-ended questions, they were inquired about their interests as follows.

In the questionnaire "interest" was first defined for the participants, word-by-word as: "*any subject or activity that you like a lot, that you spend a lot of time with and that means a lot to you.*" They were then asked to fill in the succeeding open-ended fields and (a) list out their favourite interests and (b) circle the one that is most important to them. After this, they were asked to textually describe the activity as clearly as they could in a short field.

The next questionnaire section inquired the participants about the time spent on their above specified primary interest in eight different contexts on a scale from 1 = "Not at all or very little" to 5 = "Most of the time." The contexts in this case were (a) *in school*, (b) *outside of school*, (c) *alone*, (d) *alone on the Internet*, (e) *together face to face*, (f) *together via the Internet*, (g) *informally* and (h) *guided by an adult*. The values for each of these contexts were then summed together to represent the overall interest pervasiveness.

The above-described interest pervasiveness—values were used as primary sorting criteria for the dataset of the class cohort available ($n = 76$) to list out participants with the most intensive personal interests blended across contexts. Abductively based on the genres of socio-digital participation adopted from Ito et al. conceptualization (Ito et al., 2009; 2010) we looked at the participants' textual personal interest descriptions and aimed at including different genres of participation among the interviewees, ranging from the more *friendship-driven hanging out* with friends and family to the more digital *interest-driven messing around* and *geeking out* types of activities.

Taking all this into account, the 20 first applicable participants from this dataset were invited to a maximum of one-hour long interview taking place at their school during general study hours in the fall of 2014, the first semester of the students' second year of high school. In the end, 15 participants managed to participate in the current interview-study.

2.3 | Semi-structured interviews, including egocentric network drawings

The *semi-structured theme interviews* addressed the development of the participants' interests and personal significance of interest-related activities and networks (Kvale, 2008). We aimed at answering to **the research questions 1 and 2** concerning the qualitative aspects in and the similarities and differences between the participants' SDP, networking and their personal significance through data collected through the interview themes regarding:

1. *Hanging out online* (devices and applications, networking services, instant messaging applications, psychological needs and social hanging out), to explore the general socio-digital networking patterns and potential differences in these between the different kinds of interests.
2. *Interests and hobbies* pursued, to explore the multiplicity of interests (Akkerman & Bakker, 2019) and more in depth the qualitative aspects and personal significance of the concurrent, most intensive personal interests (Hidi et al., 2004) of the participants. For the investigation to best gauge potentially emerging phenomena and the stability in the adolescents' interests, the participants were not requested to describe the specific interest according to which they were selected to the interview, but instead allowed to express also any fresh personal interests in the interview situation.
3. *Digital competencies* (orientation towards digital technology, skill profile, social recognition), to explore the potential differences in these between different kinds of interests, different levels of interest intensity as well as different kinds of networking patterns.

In connection to the theme of *interests and hobbies*, the socio-digital networking patterns related to the participants' personal interests were investigated by asking the participants to draw their interest-related *egocentric network* and explain, simultaneously, the qualitative nature of alters, ego-alter and alter-alter ties (e.g., Hogan, Carrasco, & Wellman, 2007; Marsden, 2002; McCarty, Molina, Aguilar, & Rota, 2007; Wellman, 2007). The egocentric network drawing is a pen-and-paper counterpart to the betweenness measure derived from social network questionnaires (Marsden, 2002). Its purpose was to investigate the participants' egocentric social networks related to their personal interests in more detail and depth. The participant drew themselves in the centre and around them the most important people or groups in relation to their (socio-digital) interest in question (McCarty et al., 2007), and verbally described and sometimes wrote down the qualitative nature of the relation at the same time. The other parts of the interview were used to complement the data when necessary.

Research question 3 was examined with an interview theme regarding the *pervasiveness* of the participants' SDP in general and the connected effects to schoolwork. We also asked the participants to reveal their experiences of possible "digital addiction" (Dhir, 2015; Kuss et al., 2014; Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009) and associated negative psychological and social

consequences, along with related indicators drawn from other parts of the interview. The participants were thus inquired also about their conceptions on the addictive aspects of socio-digital technology (Kuss et al., 2014) and the related interruptions of their schoolwork.

The interview recordings lasted from about 30 to 65 min and there were in total 700 min' (almost 12 hr) audio materials transcribed. The interview transcriptions ranged from 4,400 to 8,600 words and the total word count of the transcriptions was 87,900.

2.4 | Methods of qualitative data analysis

The interview data were analysed through qualitative content analysis using an abductive strategy (Peirce, 1878/2001) thus basing on previous theories and empirical findings (most notably the genres of Ito et al., 2009) as well as data-driven discovery. Concepts indigenous to the material, that is, the participants' personal experiences, were examined with the previously formed genres as sensitizing categories guiding, but not limiting observation (Denzin & Lincoln, 2011; Krippendorff, 2004; Patton, 1990). The coding of the transcriptions in Atlas.ti was conducted conceptually and thematically in relation to the interview themes, the research questions, as well as themes arising from the data itself, to extract the essential aspects of the participants' personal experiences in-depth. The open-ended questionnaire data was used to complement the interview record by further qualitative insights. The essence of each participant's SDP is synthesized in Table 1.

The *egocentric network maps* were digitized and pseudonymized with gender-preserving aliases for purpose of analysis. The network maps were compared structurally and qualitatively, considering factors such as number of nodes and their qualitative aspects, such as the designation of names and/or group titles (the designations of groups interpreted as indicating less intimate relations than that of names). Here we of course do recognize that the whole network of individuals is a lot more complex phenomenon and it might sometimes be difficult to isolate one's interest-related connections. However, the extent to which the egocentric interest network covers the whole capacity of a person's overall network depends on, precisely, the interest intensity and pervasiveness at the heart of this study. Thus, it is questionable whether the interest chosen for this section of the interview describes the totality of the interest or simply, that is, one line of practice within it (Azevedo, 2011, 2013; Renninger et al., 2014). Of course there might also be latent background factors in place based on, that is, how the person draws their energy from either social interactions or solitary activities in their interest (McCrae & Costa Jr., 2008) that might reflect on the scarcity or style of reference to the interest-related egocentric network. Thus the whole transcribed interview material was used to complement the maps when necessary for analysis and presentation. This supplementing material was also used to help determine whether the interest chosen for the egocentric network map indicate merely a line of practice within a larger interest totality (Azevedo, 2011, 2013).

2.5 | Selection of cases to describe different depths and networks in interest-related SDP

To present these results in a meaningful, readable format we chose to select six cases among all the participants (the ones indicated by pseudonyms on Table 1) to describe the essential variation in these adolescents' SDP. Our intent was to capture the variation along the participants' 1) depth of SDP as according to the three Ito et al. genres and 2) width of their networks indicated by their hand-drawn maps. The selection of the cases progressed as follows. First, each participant's depth of SDP was categorized as either 1) friendship-driven (*hanging out*) or 2) interest-driven (*messing around & geeking out*) in nature (see Table 1, Ito et al., 2009). Note the emphasis here on the term "digital," as the participants might have non-digital activities that are interest-driven, but the focus here is on the digital nature of the activities. Thus, the participants who selected non-digital interests to focus on in the interview were interpreted to portray the more friendship-driven participation regarding their socio-digital engagement. Second, we further analysed whether there might be interest-driven activities that match the deepest level of Ito et al. genres, (3) *geeking out*, in which case, as described above, the participants are even able to bend or break socio-digital rules and might even achieved highly acclaimed expertise in their area of interest. In this process, the participants' interest pervasiveness-values from the questionnaire were utilized. We found at least two participants who clearly portrayed this level of socio-digital engagement. The rest of the interest-driven participants were interpreted to portray (at least) *messing around*—type of socio-digital engagement. Third, the participants' egocentric network maps were utilized to determine the width of networks as either (a) larger or (b) smaller. To present the results in a meaningful format we selected six cases varying in depth of SDP along the three of the Ito et al. genres (1, 2 & 3) and with either (a) larger or (b) smaller networks. These cases are presented in the Results-section as according to their SDP depth and network width, progressing from the deeper (3 & 2) to the less (1) and (a) wider to (b) narrower.

3 | RESULTS

The data revealed interesting, fine-grained details about adolescents' socio-digital participation (SDP) and networking. We shall, according to the research questions, describe the participants' interest-driven SDP, address the significant similarities and differences in their interest-driven SDP and networking and finally, present their reflections on the pervasiveness of the ubiquitous socio-digital technologies in their lives and their connections to schoolwork.

3.1 | RQ1: Descriptions of the participants interests and the related socio-digital participation

To address the first research question we will describe six distinct cases differing based on their depth or dominating genre of socio-

TABLE 1 Synthesis of the interview data and egocentric network drawings of all the study's participants in order of selection for the interview

ID	Interest	Description of the interviewed interest	Genre of SDP ^a	N of ties /map	N of groups /map	Interview duration (min)
Cas-sandra	Drawing	The most intensely engaged out of all the 15 participants. Hard to distinguish beginning of interest. Has an art blog (Tumblr) with a few hundred regular followers or fans. Self-taught user of a drawing tablet and image editing software. Loves to create entire universes of characters in her work. Other interests: Reading an online comic, writing (fanfiction), gaming, blogging, cosplay, discussing interests with S.O. whom she has met through her art blog.	3	3	2	61
Garry	Gaming	Has few different games he gets engaged with periodically. These are mostly team-based. Other interests: Computers in general, watching anime, reading, soft fencing, hanging out with friends and girlfriend. Very high ICT competences.	3	5	2	46
P3	Dancing	Begun the hobby from an older sister's example with a friend and from mother's encouragement. Encouragement and admiration from family, friend's support and motivation from the teacher keeps going. Other interest: Writing stories on the computer, music in general, photography, relationships and travelling.	1	4	2	N/A ^b
P4	Piano	Beginning easy to distinguish: When starting piano lessons and family purchased the instrument. Mother's regret on her quitting as a teenager made her want to continue. Browses the internet for sheet music and inspiration. Also enjoys dancing, going to the gym, writing and has had a blog from which she has learned to code html and been able to share her play.	2	3	1	43
P5	Gym	After quitting volleyball continued sports in the form of gym workouts. Mentions browsing the internet for workout tips and inspiration. Discusses the interest almost constantly with friends at school.	1	8	0	45
Sab-rina	Activity (CAS)	CAS (creativity, activity and service) is a compulsory part of the IB curriculum. Had decided to complete her activity-part by aiming to enhance her oxygen uptake through jogging and occasional boxing. Active organizer of common school events, such as the second year ball, that is, on Facebook.	1	2	0	55
Bob	Football	Plays non-competitive football. The reason for continuing practice after competitive team fell apart because of appearance-reasons. Mentions picture editing to enhance selfies. Mostly interested in hanging out with local friends.	1	2	2	42
Paula	Scouting	Magazine editing skills through experience in troop magazine editing. Tumblr "activism", interest in social and human rights issues worldwide. Other interest mentioned: Dancing.	2	11	0	54

TABLE 1 (Continued)

ID	Interest	Description of the interviewed interest	Genre of SDP ^a	N of ties /map	N of groups /map	Interview duration (min)
P9	Gym	Goes to gym for health reasons. Socio-digitality only in the form of asking friends and siblings to join on WhatsApp.	1	5	0	39
Cody	Gaming	Mostly interested in strategy games, solo. Helps his brother learn league of legends. Other interests: Playing the guitar.	2	3	0	48
P11	Following politics	Does extremely well at school and enjoys writing essays, which has to do with the interest in societal issues and following the news and social media actively. Other interests: Interior design and browsing Pinterest.	2	5	1	62
P12	Basketball	Plays competitive basketball. Mentions having a WhatsApp group for team members where they inform about cancellations and talk off-topic.	1	7	1	30
P13	Gaming	Mentions gaming having gotten intensified after family moved to another city. Has siblings that game as well. Other interests: Badminton, watching anime, reading, browsing the web on situational interests, hanging out with friends.	2	15	1	40
P14	Art	Is intensely engaged in an online art community of bloggers, "tweeters" and "YouTubers" or "vloggers". Favourite subject to depict: Landscapes/scenery. Is the only one who mentions wanting to make their primary interest into an occupation (theatre set designer). Hard to distinguish beginning of interest.	2	4	2	47
P15	Band	Inheritance of a guitar and keyboard from his grandfather was the starting point of musical interest. Found a guitar teacher through his friend's father. Plays about 2 hr a day, weekly with the band. Browses notes and tabs online. Parents have purchased gear, cheered on and always listened to music at home. Spends a lot of time on Facebook while listening to music.	2	6	0	N/A ^b

^aGenre of the participant's socio-digital participation abductively inferred from the participant's record. 1: *hanging out* (friendship-driven), 2: *messing around* & 3: *geeking out* (interest-driven; Ito et al., 2009).

^b"N/A": Data not available.

digital participation (SDP. Ito et al., 2009) and the width of the related egocentric networks as derived from the egocentric network interview data. We will progress with these descriptions from the most intensive forms of participation to the least and from the wider networks to the less, respectively.

3.2 | Geeking out

The two cases presented here were selected to depict the most intensive genre SDP as coined by Ito et al. (2009). Thus, they had, among all the interest-driven participators, clearly engaged in bending or

breaking technological rules and achieved even highly acclaimed expertise through actively *geeking out* in the socio-digital realm, according to their interview record.

3.3 | Garry—Geeking out in gamer networks and the OS-movement

Garry is our participant second highest on interest pervasiveness and, according to his qualitative record, highly engaged in bending and breaking technological rules, be it in gaming- or even programmatic environments. In his pastime, apart from hanging out with his

friends and girlfriend, developing his Linux skills, watching anime, reading and soft fencing, Garry enjoys gaming online with his friends. He keeps playing various computer games daily with friends, whom they customarily invite each other playing via chats dedicated to different groups of people on practical desktop applications. His passion for gaming begun in a neighbourhood crowd around the time he was 10 years old. This group still forms the basis of his dense core group of six friends (indicated on his map in Figure 1). Garry says they share “an unspoken agreement” of not adding additional folk to their chat, and for the purpose of adding external members for a game session, a new chat is created every time. While in-game they practically “hang out on the phone” the whole time through different VoIP:s (Voice over Internet Protocols). When talking about his gaming-related affinity space he almost exclusively describes social relations, and for example, the activity of collectively “pubstomping” certain game servers with his “clan,” for fun. He describes his hobby as non-competitive, although he has taken part in a couple of tournaments, which “took a lot of practice.” The second important group on his map consists of individuals Garry has acquainted with completely online. It includes a chat of approximately a 100 people, nationwide and a couple internationally, with whom they do not all play as regularly together, as a group call of a 100 people would “get painful and everybody would just shout on top of each other.” They, however, regularly chat in textual form and meet face-to-face in a group gathering approximately once a month at some location in Finland. Despite constantly maintaining over a hundred people’s wide social network online, Garry has left Facebook years ago because he does not agree upon the service’s functioning philosophy of monetizing the users’ personal information. His digital skills are seemingly exceptional among all the study’s participants, and along with mastering multiple programming frameworks, he mentions controlling his two computers and organizing hard drives through the command prompt on an old laptop with “only a small Linux.” He mentions that “Understanding the concept

‘Free as in Freedom’ has become an important part of me” truly epitomizing the philosophy of open source culture (using the reference: Williams, 2002).

Garry: “—You basically just learn like little by little by having fiv--- by regularly participating in five-person phone calls, you learn for real how to talk differently. You have to wait completely differently, when... like to give others turns.”

3.4 | Cassandra—Art geeking with the S.O., for the fandom

Cassandra, on the questionnaire, portrayed the absolute highest interest-pervasiveness in her class cohort. She is a highly acclaimed (digital) artist with a personal fandom of a “few hundred” individuals, thus also indicating geeking out-level socio-digital engagement. Her involvement in her art-related affinity space gives her a liberating feeling of “leaving something behind.” It is hard for Cassandra to distinguish the exact beginning of her interest, since she has “always enjoyed drawing” and actively used the opportunity to doodle whenever and wherever she can. She maintains a personal art blog, including its visual appearance through markup code and style sheet programming, and mentions regularly “commenting” on the episodes of a specific, niche web comic in her own creative work. Reflecting on her identity and mindscapes, she mentions the importance of her fans and other relationships from the point of view of socioemotional support as well as an occasional desire to try to shock people with her imagery. The socio-digital network of Cassandra (Figure 2) consists of these groups and only of few individuals, who are apparently socioemotionally very close to her: her (deceased) mother, her previous partner and the current partner whom she met through her own art blog. As a life goal she mentions her commitment to make her current relationship last, which further emphasizes the high qualitative importance of this dyad. She

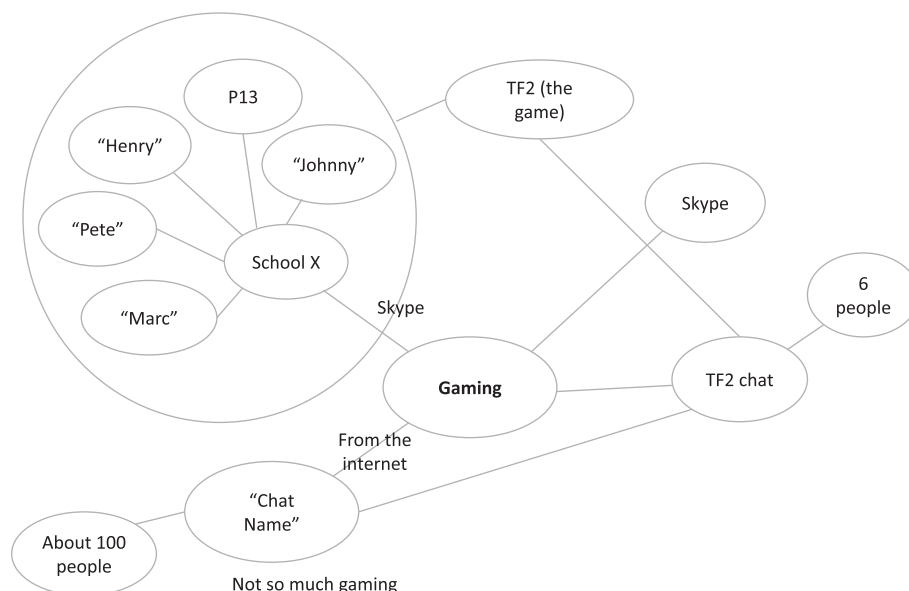
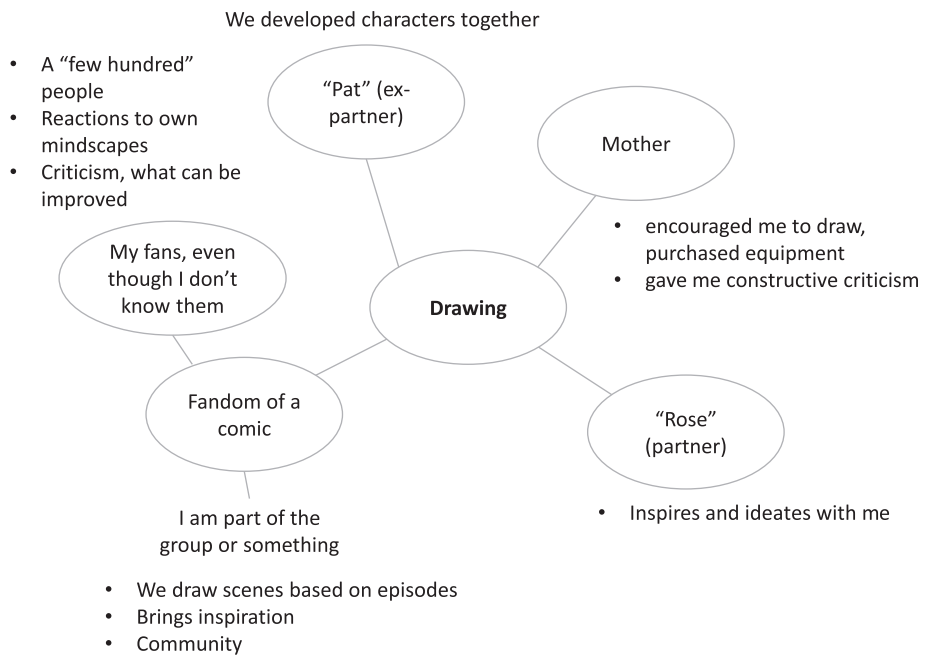


FIGURE 1 Garry’s gaming-related egocentric network map. Notice the large amount of both intimate friendships indicated by designated names to the 6-person, within-school core group, as well as out-of-school friend groups with an online context of origin, the whole network thus apparently consisting of over a 100 people

FIGURE 2 Cassandra's drawing-related egocentric network map. Notice the scarcity of names that are, or were, however, socioemotionally very intimate dyads, and the abstract form of referral to online groups (i.e., "fandom") regarded important for this intensive socio-digital interest. Notice her referring to her fans whom she "does not know," although she estimates their amount as a "few hundred"



loves creating entire universes of characters in her illustrations and blog posts with the inspiration of her "muse," which she then publishes online in English for the inherently international "fandom" of her blog, awaiting reactions and possible feedback on which to improve her work upon. Besides the necessary visual programming for the blog, she is also a skilled, self-taught user of a drawing tablet and image editing software, which she uses in digitizing her work. Her other interests alongside drawing include writing, gaming, psychology, sexology, reading and cosplay. She is the only girl among all of these participants who mentions digital gaming as a hobby, and is most interested in roleplaying games with intriguing characters and storylines.

Cassandra: "But yea, so why does drawing excite me? Well... *sighs*... It might be partly because you only leave so much behind after you die... With art, you leave something. Something nice. Plus I can show people what's happening inside my head, what I am thinking of, and also jot down for myself what I'm thinking of. Plus it pleases the eye, it inspires other people. And being able to draw anything is just a great feeling as it is. -- Well fandom means this like fan base around some specific series, so member of that kind of group. -- Online. Of course, you can find them in real life as well, or so. Like they're not centred around a specific website, they basically just are. -- It's basically this larger metaphysical concept. 'We are all one even though we don't know each other or belong anywhere...'"

3.4.1 | On Garry and Cassandra

Although both Garry and Cassandra seem to portray geeking out-level behaviours there are, as we can see, some central differences

between these, in addition to similarities. Although Garry also mentions his intimate relationship as a passing remark, it is inexistent in his interest-related egocentric network whereas Cassandra's map clearly zooms in on her intimate encounters. Garry, on the other hand, seems to have this clear hangout-networking-component to his interest-driven behaviours in the way, that is, the interaction with his core group extends from physical environment (school) to the digital realm mediated by the shared interest in team-based digital games. Cassandra's more abstract referral to her "fandom" and the cosplay con's she mentions attending, as well as the digital source of origin of her intimate relationships, seems to indicate a sort of "interest-first"—attitude to her relationships and a less outgoing, more dyadic mindset. In this sort of an inverse way to the typical friendship-driven behaviour, also some of Garry's wide networks extend from the online to the physical rather than the other way round. Alternatively, where Garry indicates complex computational-societal reasoning behind his type of SDP and absence from certain platforms, Cassandra's indicated motives for her socio-digitally intensive geeking out seem to be related to personal self-expression and development in her artistic endeavour, for which she mentions having achieved wide social recognition among her curious followers.

3.5 | Messing around

The following two cases' socio-digital participation (SDP) was, according to our analysis explained above, best characterized as somewhat lighter exploration and *messing around* with digital media production and manipulation (Ito et al., 2009) as compared to the previous cases. These two cases, among all the interest-driven participants, were selected based on their qualitatively interesting type of digital exploration and essential differences in egocentric network

size. To describe the emergent interests in societal influence apparent in these participants, we combined the related interest profiles of Paula's extensively described secondary interest in online activism and P11's personal interest in "following politics" (Table 1).

3.5.1 | Paula—Messing around by (re)blogging for a better world

Paula is a nascent activist currently trying out her societal influence globally via the socio-digital realm through her Tumblr-blog and network, thus portraying (at least) messing around-level socio-digital behaviour. Studying for an IB degree, Paula is a very motivated and successful student at school as well as her scouting troop and dance classes. In addition to following the news on Facebook, she holds a microblog on Tumblr where she follows other international blogs by individual activists and NGOs that regularly post content on recent human rights issues and developments. She spends much time liking and "reblogging" these content to her likeminded followers, as well as commenting on conversations when she has the time. Through this experimental engagement, she thus wishes to extend her influence on a global scale with the purpose of making the world a better place for all people. Apart from school, she has picked up a lot about the political sphere from the discussions with her likeminded mother over dinner as well as TV news, which has also sparked her interest to some extent. With conscious groups of school- and scout mates, they also discuss the most interesting issues and recent events in more closely-knit WhatsApp-conversations. Her interest-related socio-digital network is thus an organically pulsating global web of conscious individuals aiming to spread awareness and make a meaningful difference in this world based on deeply held values, which she elaborates on her map (Figure 3). Perceiving her position on a more abstract, societal level, as an influential member of representative democracy, she has added nodes on her map for a politician she highly appreciates and

one she deeply detests. Through editing a magazine dedicated to her scouting troop, she has also acquired some amateur editorial skills and mentions tweaking the visual programing on her Tumblr-blog every now and then.

Paula: "--especially that Tumblr is kind of like... Well, interesting, because... -- Like the activism or that, it's not -- like anyhow 'real' activism, but anyways, I've received a lot of information on issues through -- Tumblr. -- like this whole 'Ferguson situation', so to speak, [contemporary to the events of the so-called 'Ferguson Unrest' in the USA] -- I wouldn't have known -- anything about it without it [Tumblr], or I wouldn't have been like interested or anything, and... Well there are other issues too, so... -- Well I have received a lot of information, and um, these group conversations we often talk about these kinds of things, kind of like... It's also, like, important to me that... And I like having conversations, and so..."

3.5.2 | Cody—Messing around with games for overpowered strategy

As also an active gamer, Cody, unlike Garry however, more privately works to optimize his performance along the rules of the particular strategy games he is engaged in, thus portraying messing around-level behaviour. Apart from occasionally playing guitar, most of Cody's pastime goes into playing different kinds of games on his computer, such as Starcraft, League of Legends, CS GO as well as classic chess. As his primary motivation for playing he mentions "wanting to be as good as possible" in whatever he does. He describes sometimes browsing YouTube videos and forums to educate himself on the best practices discovered by the affinity community in relation to these games. Apart from his little brother whom he also guides and educates into the world of the team game League of Legends, he says he mostly plays the game

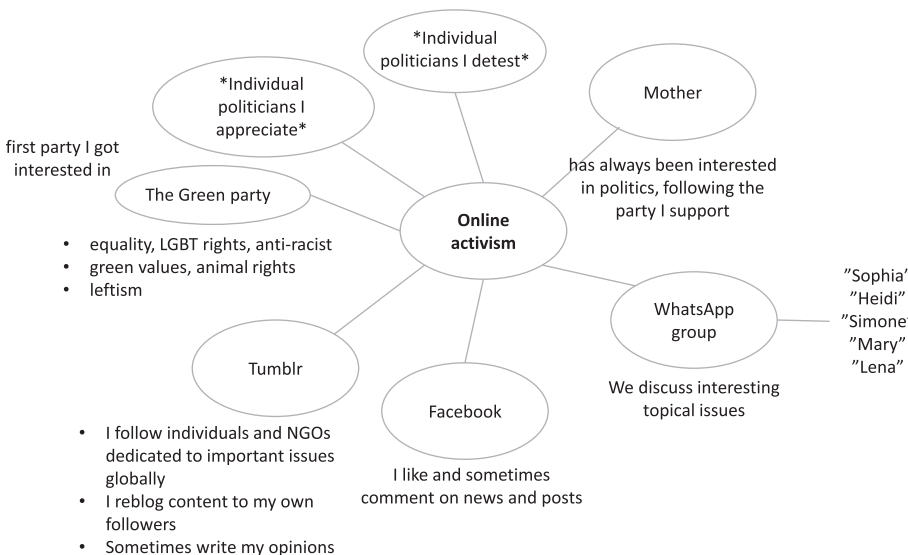


FIGURE 3 Paula's interest-related ego-centric network map on her online activism. Notice the five names indicating close friendships with the shared interest. The abstract conception of oneself on a more societal level is apparent in the way she refers to political parties and decision makers of interest regarding the personally important issues. Due to the nature of the, that is, blogging activity and the abstract forms of referral to groups it is, again, hard to decipher the exact size of her interest-driven network

with “strangers” online. He has one “best playmate” he met already in the lower grades, Jonathan, indicated on his map (Figure 4), and through him, he sometimes finds himself playing with two other individuals whom he only knows by their gamertags, as well as “other Steam friends” on his gaming platform. Cody’s self-described presence in school-related social media groups is practically inexistent, which perhaps emphasizes the deep, rather contribution than socially oriented involvement in the gaming practice, which has not produced him any self-recognized competencies either. Being generally very scarce in words, the interview methodology might however limit these conclusions.

Q: “So how would you describe your usage of these [social media, including Steam]?”

Cody: “Well on Steam you can buy games anyway.”

3.5.3 | On Paula and Cody

Although both Paula and Cody are here regarded as portraying messing out-level behaviours there are clear fundamental differences between these. First of all, the nature and motives of their endeavours are fundamentally different as either Cody’s logical optimization in the game environments or Paula’s social influence on an ultimately societal level. Both, however, consider their engagement as strategic optimization of the systems they are engaged in. One essential difference is in the nature of Paula’s active, instrumental social interaction for societal impact and Cody’s private mission for personal wins, although he does mention situationally also helping out his brother. Paula’s network is thus a lot wider and tighter when compared to Cody’s, which consists of fundamentally less intimate ties and only one, somewhat closer friendship is mentioned.

3.6 | Hanging out

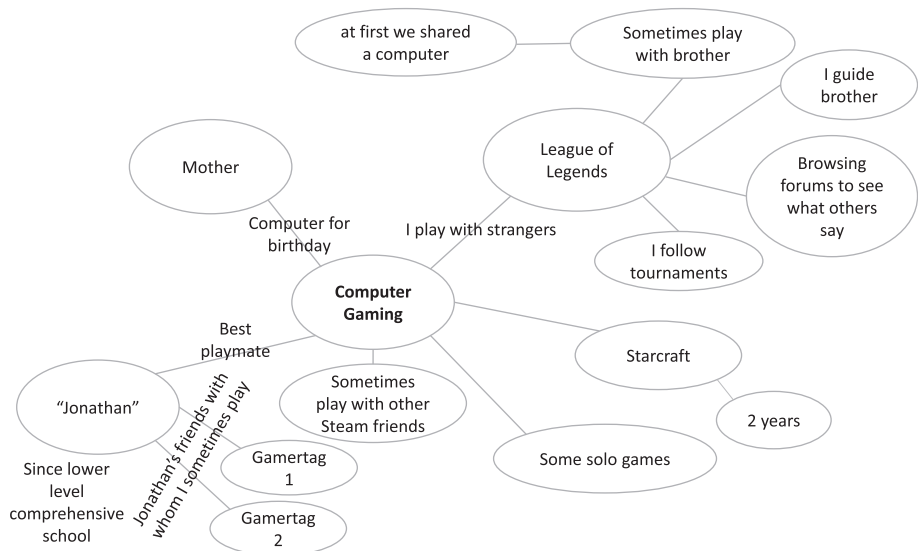
According to our analysis on these interviewees’ record, the following case descriptions present the sort of socio-digital participation (SDP)

mainly oriented towards *hanging out* in the local peer networks and merely extending the primarily face-to-face interactions to the digital realm (Ito et al., 2009). These participants chose to select essentially non-digital interests to focus on in the interview situation, and these are here regarded as more of the sort of lines of practice (Azevedo, 2011, 2013) in their more central interests of friendship-driven networking.

3.6.1 | Sabrina—Volunteering for influence in the local network

Sabrina, according to her qualitative record, is very much oriented towards helping her wide network of friends organize common pursuits via the different social media—applications she is profiled in. After moving to her own place as an out-of-towner Sabrina is extremely enthusiastic about her choice to apply for the IB-program. She mentions being an active voice in multiple WhatsApp-groups dedicated to locally formed cliques from, that is, her previous hometown, by her current female classmates as well as a “support group” of other schoolmates who live alone without their parents. She is very engaged in their school CAS-project (Creativity, Activity & Service, an IB speciality), which, in addition to creative pursuits enables her to be of service to the community at large, like in the Pink Ribbon—campaign she mentions below regarding her earlier Service-project. At the moment, she is committed to carrying out her Activity-project of enhancing her blood oxygen uptake together with a friend, Annie, as well as their supporting PE teacher, George (being the only teacher mentioned on the egocentric network maps, Figure 5). She has also taken up the important responsibility of organizing the Finnish traditional second-year high school ball and the related fundraising. She utilizes her Facebook actively in the process as well as the related announcement in addition to the more traditional school morning assemblies. She also mentions the concurrent difficulties of organizing parties on Facebook because they easily get “out of hand” regarding gatecrashers, as she

FIGURE 4 Cody’s egocentric network map related to his gaming interest. As you can see, there is only one friend outside family with an indicated name, and on the map there are two gamertags indicated with the characterization of a distant relationship (the real names thus being apparently unknown)



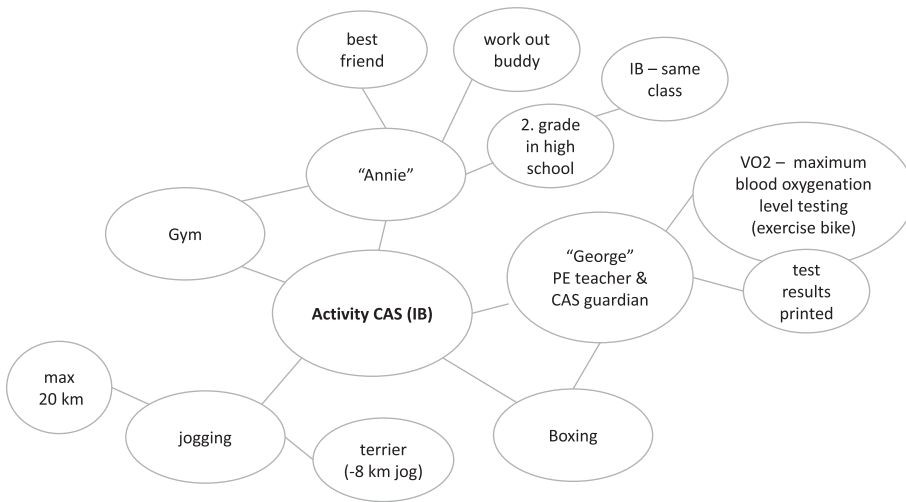


FIGURE 5 Sabrina's egocentric network map regarding her concurrent school activity-project. We regard this selected, non-digital interest as a line of practice (Azevedo, 2011,2013) in her more central interest of friendship-driven networking and influence, and thus conclude it does not depict her actual interest-driven networks in their totality. Notice however, how Sabrina is the only one indicating a teacher as a node in their egocentric network map

would like to focus on meaningful interactions with people she actually knows. This is why she sees that is, WhatsApp as a better functioning channel for organizing events for her closest circles.

Sabrina: "Well sometimes, on Insta, I update if we have done something extremely like fancy or nice, like for example we've been volunteering for the Pink Ribbon -campaign that I want to publicize -- and because everybody will see them anyway, and it's an issue I want everyone to know of because it's really important to me and so..."

3.6.2 | Bob—Engaging in team sports to enhance physical appearance and status in local network

Despite attending a scouting group and a soccer club, Bob regards as his favourite form of pastime hanging out with his friends. He further describes them regularly driving to the local burger joint with a microcar to eat burgers while chitchatting with each other face-to-face. He enjoys the opportunities offered by social media and instant messaging to keep constantly in touch with his friends in different WhatsApp-groups, although the emotional content sometimes get lost in textual communication. When it comes to using socio-digital technologies and digital skills brought about by his personal interest (hanging out with friends), he mentions having learned minor picture editing with mobile- and desktop applications to enhance the look of selfies for social media, where he posts pictures approximately every 2 weeks. His personal interest chosen for the interview is soccer, which he initially started through first trying out the sport with a group of friends. After his competitive team fell apart, he continued with the hobby along with a friend, Jack (on Figure 6), because of "wanting to take care of their appearance a little." Most of his other current teammates, including the coach, are already adults and have differing lives and interests to them, and there is not really that much to talk about with them. Bob's father still keeps rooting him on in his sport by coming to see his games and driving him to practice regularly.



FIGURE 6 The egocentric social network of Bob's non-digital soccer interest, which seems to be a line of practice in their friendship-driven networking interest. Notice only one close friend indicated by name in relation to this interest, and the rest of the sports team indicated as a group of more distant individuals

Bob: "But WhatsApp is like nice, because I can be connected to my friends all the time. -- Well, like -- before entering the field it is like the youth go into their own bunch there and the adults hang out in their own bunch, until we start gaming there, then we mix up of course... or like we mix up the teams and then you can be with the adults, but it's not like any adult would come hassle with us, that doesn't happen."

3.6.3 | On Sabrina and Bob

Although Sabrina and Bob both portray friendship-driven hanging out-level behaviours, again, these two participants' SDP, according to their descriptions, seems fundamentally different in certain respects. Both of them do describe utilizing socio-digital technologies to extend

the participation in their local networks digitally and sharing common experiences. Sabrina, however, seems to play a much more active part and oriented towards pro-social, even societal impact and interaction whereas Bob does not describe such an active role in his circles. Although both of them selected the non-digital sports interests for their egocentric network drawings, they describe their motivations as either more health- or straightforward appearance-related.

3.7 | RQ2: Similarities and differences in the experiences of using socio-digital technologies for the friendship- and interest-driven genres of participation and networking

As we can observe, there were multiple similarities and differences between these six individuals' friendship- and interest-driven socio-digital participation (SDP), networks and their qualitative significance to them. First of all, although different interviewees' reports indicated differing depths or genres of SDP with the most intensive, geeking out-level interest-driven behaviours more infrequent, all of the other genres were more or less present in also the intensely engaged participants' SDP, as in line with the theory (Ito et al., 2009). For example, Garry, whose SDP was certainly of the geeking out-level, reported regularly hanging out with his wide online network also face-to-face at school and at parties. However, in inverse relation the original description of hanging out-level SDP, with that is, Garry and Cassandra the friendship-driven behaviours extended also from the originating online to face-to-face contexts, rather than simply the other way round. As the participants' SDP in "general" situations was not the object of this study but rather in relation to their interests, we cannot comprehensively address the nature of their genres of engagement in other situations. However, it would seem that the overall picture of the networking patterns and SDP of the most intensely engaged socio-digital participants is widely coloured by their interest.

There were interesting differences in the sizes of interest-driven socio-digital networks, and the egocentric network drawings thus added a new, meaningful dimension to the socio-digital participation (SDP) genres, in this respect. There were participants with larger as well as smaller interest-driven networks on the level of each of the three genres of SDP. The at first hand similar-seeming interests, by their labels, also appeared very different in this respect, that is, differences in "gaming" between Garry and Cody. Figure 7 illustrates each of the above cases by their depth of SDP (1–3) and interest-related egocentric network size (a–b). Regardless of size, the digital interest-driven networks seemed to be geographically wider than the non-digital interest-driven, even reaching an international level with some of these cases, albeit there were also exceptions in this regard as well. Along with size and width also the depth differences in the interviewees' socio-digital networks is important to note, as that is, Cassandra's fewer indicated nodes on her interest-driven network were socioemotionally very intimate, her current and previous partners, qualitatively significant relationships of a more dyadic nature. At the other end, there was for example, Cody with only gamertags presented of his gaming buddies and Bob with his mainly adult soccer "team" with "not much in common" with him.

There were also several lines of practice (Azevedo, 2013; 2011) visible within larger interests and motivational patterns that can be focused on without acknowledging the whole picture. This is the case, that is, with the more locally friendship-driven participants' typical choice of their sports hobbies for the interview, a line of practice to take care of their health or physical appearance and attractiveness in the social circles where their actual centre of interest lies. In addition, some interviewees presented a multitude of intensive interests of which it was difficult to select the one to focus on, that is, Garry's Linux practice and his fascination with the Open Source—philosophy alongside gaming.

As apparent from the above cases, the participants described the individual, personal significance of their interests extensively. There were, however, some apparent similarities between these drivers

		DEPTH OR DOMINANT GENRE OF SOCIO-DIGITAL PARTICIPATION		
		1) hanging out	2) messing around	3) geeking out
EGOCENTRIC PERSONAL INTEREST NETWORK	b) smaller	Bob, football	Cody, gaming	Cassandra, drawing
	a) larger	Sabrina, CAS	Paula, activism	Garry, gaming

FIGURE 7 Cases described according to their depth or genre of socio-digital participation (Ito et al., 2009) and egocentric interest-driven network width. Participant-designated interest labels are indicated with each participant

behind the differing forms of SDP. For example, Garry, Bob and Sabrina all described inherently *social* motivations for their SDP (Deci & Ryan, 2010). Then again, Paula and Sabrina both had clear objective of influence or some kind of *contribution* to society (Eccles et al., 2008), be it in their more local networks regarding organization of school events or on a global level regarding more abstract, human rights issues. On the other hand, both Cassandra and Cody, through describing motivations such as “*leaving something behind*” of themselves or wanting to “*be as good as possible*” in their craft seemed to portray a kind of apparently less social or societal level *contribution* orientation towards their specific form of socio-digital activity they are attempting to master.

3.8 | RQ3: Pervasiveness of socio-digital participation and its connections with schoolwork as perceived by all participants

Our third research task was to analyse how the participants reflected on the pervasiveness of socio-digital technologies in their lives as a whole. Further, we wanted to find out whether the participants had any concerns about the possible interruptions of schoolwork due to their intensive socio-digital participation (SDP). Alongside the overall reflections on pervasiveness, we touched upon the observable effects on the varying depths of SDP. As we found no significant differences between the participants' reflections across all the three genres, we only analysed the differences regarding friendship- and interest-driven participation.

When asked about the pervasiveness of socio-digital engagement in the participants' lives in general, most reported some signs of “addicted”-level use (Kuss et al., 2014). Mostly friendship-driven participation was associated with a devastating experience when lacking ubiquitous access to the web. Still, there was also variation in terms of reflection, especially in relation to interest-driven participation: For instance, those reporting personal interest in digital gaming found the idea of a power break at home definitely more disturbing than a smartphone battery dying out, as this would affect the use of their homebound PCs. Many mentioned getting stuck on their socio-digital technologies for long periods of time before falling asleep and, as a result, experiencing fatigue during the day. Some even mentioned having to wake up in the middle of the night if they hear a notification sound of a specific app, since they “*have to keep up with what's happening in their social network all the time*” due to the international, interest-driven community being awake at different hours. On the other hand, some did not report any particularly negative effects of their pervasive SDP. Some even mentioned their engagement in blogs and pictorial feeds effectively relieving stress and the negative effects brought about by, that is, bullying at school.

With the entire world constantly available to them 24/7 in their new media ecologies, the technology engagement did cause some disturbance in the participants' schoolwork according to their reflections. This was due to interruptions by mobile notifications during schooldays as well as the modifications in sleeping patterns. Some, especially those indicating merely friendship-driven participation, also

reported self-imposed attempts to keep their frequent interruptions under control by, that is, leaving their smartphones inside their locker during lessons. During homework, they reported sometimes being interrupted by sudden instant messaging streaks without the teacher's “watchful eye” guarding them. Digital gaming interests seemed to provoke similar interruptions, but not so much during school hours since the available technology was not as distracting to them. In connection to more interest-driven participation, restrictions on SDP by the parents were also more often mentioned.

It would thus seem that these adolescents were indeed worried about their pervasive SDP disrupting their lives even to the extent that they would personally call it “addiction,” which was a more commonly accepted term especially among the ones indicating merely friendship-driven participation. They also mentioned, however, multiple different means of keeping their intensive use under control. Some participants, however, brought up criticisms towards the entire concept of their and their friends' ICT engagement as “addiction,” since the term implies some kind of deviation from norm, which is, according to their experience, inexistent. It appeared just completely absurd for them having to suddenly call all their friends “addicts” because of their entirely normal use of ICTs (see Sabrina's quote below). In addition, the occasional mood symptoms that could be seen as symptoms of “addiction” (Kuss et al., 2014) were by some seen as just normal behaviours on the continuum of a particular person's personality or temperament, and not a sign of a disorder. The participants reported no negative effects of their SDP on their peer relationships (Kuss et al., 2014). This might indicate a friction between what is considered normal by the adolescents and the previous generation, especially the school personnel. The teachers may not have yet properly harnessed the learning potential of the socio-digital technologies, and thus only see them hindering schoolwork.

Sabrina: “—Like because I'm not... I don't find the smartphone addiction, I don't find it any kind of problem, because it's like... In modern society it's more rule than an exception to be like addicted to you smartphone, because it would be a completely absurd an idea not to be anyhow, like affected by your smartphone battery dying out, not to be able to communicate through the internet or social media. So as an idea it is completely outdated, in my opinion.”

4 | DISCUSSION

Our research aim was to investigate the nature and personal significance of pervasive socio-digital interests and the related network participation of adolescents. In this discussion, we will relate the gained insights back to theory on interests (i.e., Hidi et al., 2004; Renninger et al., 2014) and their socio-digital playgrounds (Gee & Hayes, 2012; Ito et al., 2009, 2010, 2013, 2020, etc.), and in the light of the features of these, formulate the most important implications for practical education and instruction.

To summarize the results of the current investigation, we, through an abductive approach driven by previous theory on these qualitative data, described six different cases of socio-digital participation, which are presented above. These cases provide richer, in-depth information of the different genres of socio-digital participation (SDP. Ito et al., 2009). Although there were genre-fluid variations apparent in almost all the participants' descriptions, most of them seemed to position quite clearly on a specific depth or genre of personal interest-related SDP, be it hanging out, messing around or geeking out, with the latter apparent in rarer cases. In addition to these genres based on the abductive analysis, the egocentric network data provided interesting information regarding the social networks related to different genres of participation. The socio-digital interest-driven networks seemed to be geographically wider than the friendship-driven networks, even on the international level, regardless of the width and qualitative depth of the network.

When looking at the overall picture of the interest orientations of these participants and the related network behaviours, the picture is twofold. It would seem that for some youth, mainly the ones at the digitally less intensive end, local networks and school are enough to provide interesting stimulation and fulfil their motivationally relevant needs for relatedness, competence, autonomy and a sense of contribution (Deci & Ryan, 2010; Eccles et al., 2008). However, some would seem to prefer their more or less intensive personal interests as mediators to form their significant social relations and perhaps simply prefer to concern themselves with the "bigger picture" or more intimate meanings when it comes to their social interactions, such as human rights in Paula's case or personal mindscapes in Cassandra's case. For these kinds of "weirdos" (Ito et al., 2009) the digital environment enables ubiquitous access to interaction with more likeminded people, in this sense, unlike anything else before. As for some youth, their psychological needs for competence, autonomy and sense of contribution (Deci & Ryan, 2010; Eccles et al., 2008), when it comes to their SDP, exceed their need for relatedness, and they prefer to simply orient towards the mastery of their craft without significant social networks (i.e., Cody and his gaming mastery). There might be different latent psychological factors behind these differing behaviours, such as personality differences regarding level of extraversion, where a smaller amount of social stimuli is enough to fulfil the social needs of individuals, or regarding openness to experience, where different participants find different kinds of stimuli intellectually appealing topics of social interaction. However, the traditional stereotypes of, that is, introverted "gamers" and extraverted "jocks" are, in light of this study, invalid, as there were indications of both introversion and extraversion among the digital gamers in this study and the non-digital sports-related networks seemed even quite scarce and shallow compared to, at least the more extraverted digital gamers'. The picture is, thus, a lot more complex than one would assume based on layman's observations.

In the more digitally intensive personal interests there was discovered to be a distinction, first of all, between *social* versus *contribution* orientation (Deci & Ryan, 2010; Eccles et al., 2008) for the particular interest or craft. These could appear as, that is, primarily wanting to spend time and participate in fun activity with friends

(gaming, sports and band hobbies) or wanting to "*be the best*" in (Trepte & Reinecke, 2011; Trepte, Reinecke, & Juechems, 2012) or make a lasting contribution with one's exceptional ability in a specific digital craft (i.e., gaming or art). Based on this data, as an emergent phenomenon influence- or contribution-oriented participation was characterized by a more knowledge- and (textual) blogging-oriented, outward world focus as well as simply the endeavour to make a difference in either one's immediate (closer to basic participation) or global network politics (Jenkins, 2016). The more latent background dynamics of these, such as the above-mentioned personality, should be an interesting topic for further investigations (McCrae & Costa Jr., 2008; Valkenburg, Peter, & Walther, 2016). It would also seem that digital interest-driven social motivations are most easily aroused by elements found specifically in the digital, that is, in-game environments, such as immersion in fantasy and make-belief worlds (Mania & Chalmers, 2001), trying out different "avatar" identities (Mäyrä, 2007), following and progressing on storylines or keeping count of levels and points, etc. One interesting question based on this data is whether this kind of identity exploration promotes similar transportation of feelings as reading literary fiction, which has been found to increase the reader's empathy (Kidd & Castano, 2013) and whether there are differences in this between different, that is, genres of games.

Concerning the peer-based learning of skills related to the interests (Ito et al., 2010), the intensive personal interests in this study (Renninger et al., 2014) manifested as the individuals mastering high-level expertise on the domain, for instance, intensive enough to develop their own "fandoms" or win high-ranking tournaments, indicating achieved social recognition within the affinity space (Gee, 2005). This naturally takes many hours, such as the development of expertise in any domain (Ericsson, Hoffman, Kozbelt, & Williams, 2018), but due to the strong, spontaneous engagement, powered by digitally mediated mechanisms for recognition as well as socioemotional support, it might not even feel like hard work to the adolescents. They described having engaged in this connected learning process (Ito et al., 2020) in a state of intrinsic motivation or even flow, an optimal experience created and sustained within the engaging socio-digital networks, platforms and devices (Csikszentmihalyi, 1988; Deci & Ryan, 2010; Ito et al., 2013). This kind of self-sustained, gradual deepening of interest in a positive, activating state (Barron, 2006; Pekrun et al., 2002) was characteristic especially of the cases of most intensive participation described in this study. However, all of the participants, regardless of their dominating genre of participation, were motivated by visible measures for achievement, be it in the form of win-lose-ratios or the amount of fans or followers of their blog and comments triggered by their creative constellations. Reflecting their innermost experiences, ideas and opinions, they might even report the personal wish of "*leaving something behind*" of themselves in these platforms. The interest-driven activity thus forms an integral part of the participant's sense of self and holds high intrinsic task value (Deci & Ryan, 2010; Krapp, 2002; Wigfield et al., 2004). As active agents in their affinity space (Gee, 2005; Gee & Hayes, 2012), be it that is, gaming- or art-related, locus of control or attributional processes might be important psychological factors affecting the

motivation (autonomy, competence & contribution, Deci & Ryan, 2010; Eccles et al., 2008) of the adolescents'. The gamified interactions (Kapp, 2012) in any case seem to reinforce the engagement, and is experienced less negatively in the digital interest- and productively oriented rather than the local "hangout" context, where one's role is more fixed to their physical features.

When it comes to the contexts of these interests and their pervasiveness reflected by the participants it is clear that the traditional boundaries between the different developmental contexts are being blended out as we speak (Akkerman & Bakker, 2011; Bonk & Graham, 2012). One might ask whether the digital devices and platforms merely present a new component to the traditional social- and sociometric phenomena (Eronen & Nurmi, 2001; Newcomb et al., 1993). This, in light of the current examination, is not merely the case. It would rather seem that the traditional physical boundaries are expanded to a ubiquitous, global level through niche gamer subcultures, activist networks and fandoms dedicated to a common mission across continents (i.e., game tournaments where teams consisting of members of Asian to American origin compete to win titles; Li, 2017; Seo & Jung, 2016). The presented hypothesis might apply in the digitally less intensive participators' case, but the digitally more intensive, interest-driven participation presents conspicuous challenges to the traditional sociometric methodology. Their affinity networks, at least the most intimate ones, seemed to offer personally significant peer groups or dyads for the adolescents in a socioemotional sense as well (i.e., Cole & Griffiths, 2007), some of whom having emerged entirely in the digital realm and dedicated to self-experimentation within it. In fact, the socio-digital environment has in some research been discovered as good as a (Downey & Gibbs, 2020; Mannerström, Hietajärvi, Muotka, & Salmela-Aro, 2018), if not even better (Adachi & Willoughby, 2013; Granic, Lobel, & Engels, 2014; Moisala et al., 2016; Przybylski & Weinstein, 2017; Przybylski, Weinstein, Ryan, & Rigby, 2009) environment for supporting youth identity and cognitive development as well as prosocial activities. Thus, updating the traditional sociometric developmental methodology to include also significant out-of-school networks should be seen as an important mission for future research. Only when, that is, the gaming passion reaches a level of obsession do the negative outcomes concerning mental wellbeing come into play, and this has been found to happen especially in situations where the basic psychological needs of the individuals are not satisfied in their daily lives elsewhere (Deci & Ryan, 2010; Przybylski et al., 2009; Przybylski & Weinstein, 2017). One must not shut out the possibility of a sort of dynamic of escapism either (Calleja, 2010; Hirschman, 1982), as in some cases the individuals in this study brought up difficult socioemotional situations (breakup or tragic death of a relative), not to mention the apparently low sociometric status of some (indicating loneliness), that might affect the intensity of their SDP. There is, in fact, recent evidence suggesting that depressive symptoms might lead to increased social media use but not the other way round (Puukko, Hietajärvi, Maksniemi, Alho, & Salmela-Aro, 2020).

There are multitude of ways in which affinity space induced learning and traditional classroom instruction are inconsistent (Gee &

Hayes, 2012; Hietajärvi, 2019). Among the most central ones from the point of view of this study are the freedom to engage in variety of interests in collaboration with peers, in contrast to the bidirectional teacher-student relationship at school and fixed identity based on external features, such as ethnicity, gender, age or class, as well as achieved status as a "good student." The meaning in the engagement of this study's participants, for example, was found in the mechanisms that support the sharing of achievements and creations, and the cycles of conversation, feedback and inspiration based on these *products*, not external features such as ethnicity or religion, which some prefer concealed. In addition, the production, not just consumption of situationally relevant information that is transformed in interactions, and not fixed by that is, the curricula, aids in gaining effective situational engagement, even flow-experiences (Csikszentmihalyi, 1988). Knowledge in the affinity space is distributed across the network rather than fixed, and engaged with in a trial and error-basis without significant fear of failure. In light of self-determination theory, autonomy, capability, relatedness and sense of contribution are the psychological prerequisites of motivation (Deci & Ryan, 2010; Eccles et al., 2008), and these are all supported by engagement within the affinity space.

The current algorithmic crisis social media giants have driven themselves in (i.e., Hughes, 2019) is reflected in the worry some of this study's basic participators found in the pervasiveness of these technologies in their lives. However, the personal significance the more interest-driven groups of SDP find in their crafts and networks proves the youth are also perfectly capable of engaging purposefully in these socio-digital technologies in a productive and learning oriented manner, collaboratively, towards a common objective.

4.1 | Towards inherently socio-digital, connected learning and education

Recent research suggests a gap between the digital learning preference of pupils in their general socio-digital ecologies and the digital affordances of the schools, on average (Hietajärvi, 2019). Pupils have also reported rather negative experiences of their teachers' readiness to support their digital engagement (Halonen, Hietajärvi, Lonka, & Salmela-Aro, 2016). The emergence of clearly more socio-politically oriented interests among upper secondary school students in this study (comparative to the categories of knowledge- and blogging-orientation of Hietajärvi, Tuominen-Soini, Hakkarainen, Salmela-Aro, & Lonka, 2015; Hietajärvi, Seppä, & Hakkarainen, 2016) might indicate the role of high school education in the emergence of some pupils' personal interests. Simultaneously, it is no wonder there is a sense of struggle in the modern classroom when it comes to young people's intensive informal use of digital technology. Teachers constantly have to compete for their pupils' attention-resource with the increasingly ubiquitous and pervasive digital devices and services (Rideout & Robb, 2018). Latest research has indeed found positive connections between the knowledge-oriented interests and school engagement, but also between high amounts of pastime action gaming and school-related cynicism (Hietajärvi et al., 2019). The relations

between social networking orientation and higher school burnout as well as lower school engagement were also notable (Hietajärvi et al., 2020).

So how do we solve this problem remains a debated question. It is a fact our adolescents today have grown up in a world in which their different ubiquitous devices keep them constantly connected to the vast network of knowledge, the corpus of all the relevant data and information ever created on any subject matter, including their more or less well-developed personal interests, and they are very much aware of this. Most of them have learned to play computer games before learning to read. The cognitive capacity has also shifted in their practices (Clark, 2003) in a way, that allows for the immediate acquisition of detailed factual information from online sources, but the abilities to critically evaluate knowledge sought and transform it into meaningful action is more important than ever (Lonka, 2018). These kinds of competence acquisition processes are spontaneously sustaining themselves when it comes to the kinds of personal socio-digital interests at the heart of this study in which the pupils have already gained expertise (Ito et al., 2013). The central challenge for modern school instruction is then to spark similar, inherently connected learning processes (Ito et al., 2020) in the pupils in relation to the school subject matter as they experience outside school. It is important to engage the youth also in the collective wisdom acquired by their ancestors through the different scientific disciplines in the course of history, as well as orientate them towards the appreciation of the general scientific mindset. Building connections between the school subjects and the extra-curricular interests of youth, could be enhanced by inquiry-based or phenomenon-based learning (Hakkarainen, Lonka, & Lipponen, 2004; Lonka, 2018).

To cultivate pupils' development of personal interest towards specific subjects at school this study results in a couple of suggestions. Teachers, first of all, need to take into account the types of participation preferred by their pupils in general. By including the central elements of games as well as creative pursuits, such as peer learning, feedback, collaboration and digitally mediated formative assessment on a trial and error basis, excluding fear of failure or shame, as well as possibilities for individual self-expression and related (sometimes anonymous) personal discussion, could contribute to the motivational aspects of instruction. Gee and Hayes (2012) introduced the idea of school subjects as essentially conceptual instruments or tools to solve the vital practical problems facing our societies. The inclusion of problems relevant to the topical elements in the socio-digital networks and cultures of the youth, as well as problems relevant to their generation in general would thus empower the pupils to learn the content in a meaningful context (Hidi et al., 2004; Renninger et al., 2014; Thunberg, 2019). This also helps in developing the pupils' sense of overall agency (Rajala, Hilppö, Lipponen, & Kumpulainen, 2013). This could mean projects that cross the boundaries of domains and address complex real-life problems (phenomenon-based learning), such as using biological expertise to trace causes of environmental risks and challenges, civics, ethics and philosophy education to address global human rights issues or the current notable ethical dilemmas related to

the development of AI systems, for example. Allowing for effective phenomenon-based learning based on the personal interests of the youth (Lonka, 2018), be it math in gaming or polemical literary expression, is an important aspect of engaging instructional practices (Ito et al., 2013).

These are, in essence, the same kinds of engagement mechanisms that the interaction design teams of the big internet companies build into their platforms, and there are already many methods and guidelines to bring them alive in the classroom. Phenomenon-, problem- and inquiry-based methods allow for learning from the point of view of student-relevant problems, and flipped learning becomes easier when successfully triggered situational interests support the self-directed learning process (Lonka, 2018). Maker-centred learning and the building of maker spaces at schools provide access to relevant tools and practices for creative socio-digital participation and trigger further interest-driven processes (Kurti, Kurti, & Fleming, 2014; Seitamaa-Hakkarainen & Hakkarainen, 2017). In this way, the actual classroom interaction can focus on personally meaningful aspects as well as pain points of the learning process. In general, teachers as much as the parents should not be afraid of the modern technologies, but make efforts to increasingly explore their possibilities with the children to learn new skills and augment their intellectual and social capabilities, which will possibly transfer to our ability to solve the wicked problems of our time. As the pupils' socio-economic background has recently been found to greatly affect their level of information and computer literacy skills in Finland (Leino et al., 2019), the appropriate school instruction is necessary to ensure equal opportunities in acquiring these important (working) life competences (Nedelkoska & Quintini, 2018).

5 | CONCLUSION

The continuing evolution of our socio-digital ecology as well as our behavioural adaptation to it requires research to keep up with the rapidly changing landscape. It is easier and cheaper than ever today to collect quantitative, big data. However, the importance of qualitative insights based on the personal records and experiences of the research objects are important to take into account, as well, before making conclusive assumptions and decisions on the tailoring of educational, political or design interventions related to them, and as basis of the future quantitative tools and models.

There were multiple discoveries made in this study, most of which augmented the results of previous research and provided important, new insights into the personal, socioemotional experiences of adolescents on their socio-digital practices. These insights may help in developing and designing guidelines for future educational arrangements, solutions and further research on the topic.

ACKNOWLEDGEMENTS

Funding for this research was provided by the Finnish Ministry of Education and Culture project 6605844 and the Strategic Research Council at the Academy of Finland projects 312527 and 327242.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare in relation to this publication.

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jcal.12506>.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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REFERENCES

- Adachi, P. J., & Willoughby, T. (2013). More than just fun and games: The longitudinal relationships between strategic video games, self-reported problem solving skills, and academic grades. *Journal of Youth and Adolescence*, 42, 1041–1052. <https://doi.org/10.1007/s10964-013-9913-9>
- Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, 81(2), 132–169.
- Akkerman, S. F., & Bakker, A. (2019). Persons pursuing multiple objects of interest in multiple contexts. *European Journal of Psychology of Education*, 34(1), 1–24.
- Azevedo, F. S. (2011). Lines of practice: A practice-centered theory of interest relationships. *Cognition and Instruction*, 29(2), 147–184.
- Azevedo, F. S. (2013). The tailored practice of hobbies and its implication for the design of interest-driven learning environments. *Journal of the Learning Sciences*, 22(3), 462–510.
- Baron, N. S. (2008). *Always on: Language in an online and mobile world*. Oxford, England: Oxford University Press.
- Barron, B. (2006). Interest and self-sustained learning as catalyst of development: A learning ecology perspective. *Human Development*, 49, 193–224. <https://doi.org/10.1159/000094368>
- Bell, V., Bishop, D. V., & Przybylski, A. K. (2015). The debate over digital technology and young people. *British Medical Journal*, 351, h3064. <https://doi.org/10.1136/bmj.h3064>
- Bennett, S., & Maton, K. (2010). Beyond the 'digital natives' debate: Towards a more nuanced understanding of students' technology experiences. *Journal of Computer Assisted Learning*, 26(5), 321–331. <https://doi.org/10.1111/j.1365-2729.2010.00360.x>
- Bonk, C. J., & Graham, C. R. (2012). *The handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: John Wiley & Sons.
- Bronfenbrenner, U. (1996). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32–42. <https://doi.org/10.3102/0013189X018001032>
- Calleja, G. (2010). Digital games and escapism. *Games and Culture*, 5(4), 335–353.
- Castells, M. (2001). *The internet galaxy: Reflections on the internet, business, and society*. Oxford, England: Oxford University Press.
- Clark, A. (2003). *Natural-born cyborgs: Minds, technologies, and the future of human intelligence*. Oxford, England: Oxford University Press.
- Cole, H., & Griffiths, M. D. (2007). Social interactions in massively multi-player online role-playing games. *CyberPsychology and Behaviour*, 10(4), 576–583. <https://doi.org/10.1089/cpb.2007.9988>
- Coyne, S. M., Padilla-Walker, L. M., Holmgren, H. G., & Stockdale, L. A. (2018). Instagrowth: A longitudinal growth mixture model of social media time use across adolescence. *Journal of Research on Adolescence*, 29, 897–907. <https://doi.org/10.1111/jora.12424>
- Csikszentmihalyi, M. (1988). The flow experience and human psychology. In M. Csikszentmihalyi & I. S. Csikszentmihalyi (Eds.), *Optimal experience. Psychological studies of flow in consciousness*. Cambridge, MA: Cambridge University Press.
- Damasio, A. R. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society of London Series B: Biological Sciences*, 351(1346), 1413–1420.
- Deci, E. L., & Ryan, R. M. (2010). Intrinsic motivation. *The Corsini Encyclopedia of Psychology*, 1–2. <https://doi.org/10.1002/9780470479216.corpsy0467>
- Denzin, N. K., & Lincoln, Y. S. (2011). *The SAGE handbook of qualitative research*. Thousand Oaks, CA: Sage.
- Dhir, A. (2015). On the nature of internet addiction: What is it and how is it measured? (Doctoral thesis, University of Helsinki, Finland). Retrieved from <https://helda.helsinki.fi/handle/10138/155069>.
- Downey, D. B., & Gibbs, B. G. (2020). Kids these days: Are face-to-face social skills among American children declining? *American Journal of Sociology*, 125(4), 1030–1083.
- Eccles, J., Brown, B. V., & Templeton, J. (2008). A developmental framework for selecting indicators of well-being during the adolescent and young adult years. In B. V. Brown (Ed.), *Key indicators of child and youth well-being: Completing the picture* (pp. 197–236). New York, NY: Lawrence Erlbaum Associates Publishers.
- Ekman, P., Dalgleish, T., & Power, M. (1999). *Handbook of cognition and emotion*. Chichester, England: Wiley.
- Engeström, Y., Engeström, R., & Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction*, 5, 319–336.
- Entwistle, N., & Ramsden, P. (2015). *Understanding student learning (routledge revivals)*. New York, NY: Routledge.
- Ericsson, K. A., Hoffman, R. R., Kozbelt, A., & Williams, A. M. (Eds.). (2018). *The Cambridge handbook of expertise and expert performance*. Cambridge, MA: Cambridge University Press.
- Eronen, S., & Nurmi, J. E. (2001). Sociometric status of young adults: Behavioural correlates, and cognitive-motivational antecedents and consequences. *International Journal of Behavioral Development*, 25(3), 203–213.
- Gee, J. P. (2005). Semiotic social spaces and affinity spaces. In D. Barton & K. Tusting (Eds.), *Beyond communities of practice language power and social context*. New York, NY: Cambridge University Press.
- Gee, J. P., & Hayes, E. (2012). Nurturing affinity spaces and game-based learning. *Games, Learning, and Society: Learning and Meaning in the Digital Age*, 123, 1–40.
- Graham, C. R. (2006). Blended learning systems. *The handbook of blended learning: Global perspectives, local designs* (pp. 3–20). San Francisco, CA: John Wiley & Sons.
- Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist*, 69(1), 66–78. <https://doi.org/10.1037/a0034857>
- Greenhow, C., & Robelia, B. (2009). Informal learning and identity formation in online social networks. *Learning, Media and Technology*, 34(2), 119–140.
- Hakkarainen, K., Hietajärvi, L., Alho, K., Lonka, K., & Salmela-Aro, K. (2015). Socio-digital revolution: Digital natives vs digital immigrants. In J. D. Wright (Ed.), *International encyclopedia of the social and behavioural sciences*, Vol. 22 (2nd ed., pp. 918–923). Oxford, England: Elsevier. <https://doi.org/10.1016/B978-0-08-097086-8.26094-7>
- Hakkarainen, K., Lonka, K., & Lipponen, L. (2004). *Tutkiva oppiminen: Järki, tunteet ja kulttuuri oppimisen sytyttäjinä.[progressive inquiry: Reason, emotions and culture as inspirers of learning]*. Porvoo: WS Bookwell.
- Hakkarainen, K., Paavola, S., & Lipponen, L. (2004). From communities of practice to innovative knowledge communities. *Lifelong Learning in Europe*, 2, 75–83.

- Hakkarainen, K., Palonen, T., Paavola, S., & Lehtinen, E. (2004). *Communities of networked expertise: Professional and educational perspectives*. Amsterdam, The Netherlands: Elsevier.
- Halonen, N., Hietajärvi, L., Lonka, K., & Salmela-Aro, K. (2016). Sixth graders' use of technologies in learning, technology attitudes and school well-being. *The European Journal of Social & Behavioural Sciences*, XVIII(1), 2307–2324. <https://doi.org/10.15405/ejsbs.205>
- Hidi, S. (2000). An interest researcher's perspective on the effects of extrinsic and intrinsic factors on motivation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation. The secret for optimal motivation and performance* (pp. 309–339). New York, NY: Academic Press.
- Hidi, S., Renninger, K. A., & Krapp, A. (2004). Interest, a motivational variable that combines affective and cognitive functioning. In D. Yun Dai & R. Sternberg (Eds.), *Motivation, emotion, and cognition* (pp. 103–130). New York, NY: Routledge.
- Hietajärvi, L. (2019). Adolescents' socio-digital engagement and its relation to academic well-being, motivation, and achievement. (Doctoral thesis, University of Helsinki, Finland). Retrieved from <https://helda.helsinki.fi/handle/10138/304802>.
- Hietajärvi, L., Lonka, K., Hakkarainen, K., Alho, K., & Salmela-Aro, K. (2020). Are schools alienating digitally engaged students? Longitudinal relations between digital engagement and school engagement. *Frontline Learning Research*, 8(1), 33–55. <https://doi.org/10.14786/flr.v8i1.437>.
- Hietajärvi, L., Salmela-Aro, K., Tuominen, H., Hakkarainen, K., & Lonka, K. (2019). Beyond screen time: Multidimensionality of socio-digital participation and relations to academic well-being in three educational phases. *Computers in Human Behaviour*, 93, 13–24. <https://doi.org/10.1016/j.chb.2018.11.049>
- Hietajärvi, L., Seppä, J., & Hakkarainen, K. (2016). Dimensions of adolescents' socio-digital participation. *QWERTY—Open and Interdisciplinary Journal of Technology, Culture and Education*, 11, 79–98.
- Hietajärvi, L., Tuominen-Soini, H., Hakkarainen, K., Salmela-Aro, K., & Lonka, K. (2015). Is student motivation related to socio-digital participation? A person-oriented approach. *Procedia-Social and Behavioural Sciences*, 171, 1156–1167. <https://doi.org/10.1016/j.sbspro.2015.01.226>
- Hirschman, E. C. (1982). Predictors of self-projection, fantasy fulfillment, and escapism. *The Journal of Social Psychology*, 120(1), 63–76. <https://www.tandfonline.com/doi/abs/10.1080/00224545.1983.9712011>
- Hogan, B., Carrasco, J. A., & Wellman, B. (2007). Visualizing personal networks: Working with participant-aided sociograms. *Field Methods*, 19(2), 116–144. <https://doi.org/10.1177/1525822X06298589>
- Hughes, C. (2019). *Opinion: It's Time to Break Up Facebook*. The New York Times May 9, 2019; Retrieved from <https://www.nytimes.com/2019/05/09/opinion/sunday/chris-hughes-facebook-zuckerberg.html>
- Ito, M., Arum, R., Conley, D., Gutiérrez, K., Kirshner, B., Livingstone, S., ... Watkins, C. (2020). *The connected learning research network: Reflections on a decade of engaged scholarship*. Irvine, CA: Connected Learning Alliance.
- Ito, M., Baumer, S., Bittanti, M., Boyd, D., Cody, R., Stephenson, B. H., Hosrt, H. A., Lange, P. G., Mahendran, D., Martinez, K.Z., Pascoe, C.J., Perkel, D., Robinson L, Sims, C., & Tripp, L. (2010). *Hanging out, messing around, and geeking out: Kids living and learning with new media*. Cambridge, MA: MIT Press.
- Ito, M., Gutiérrez, K., Livingstone, S., Penuel, B., Rhodes, J., Salen, K., ... Watkins, S. C. (2013). *Connected learning: An agenda for research and design*. Irvine, CA: Digital Media and Learning Research Hub.
- Ito, M., Horst, H. A., Bittanti, M., Stephenson, B. H., Lange, P. G., Pascoe, C. J., & Martínez, K. Z. (2009). *Living and learning with new media: Summary of findings from the digital youth project*. Cambridge, MA: MIT Press.
- Java, A., Song, X., Finin, T., & Tseng, B. (2007). Why we twitter: Understanding microblogging usage and communities. In *Proceedings of the 9th Webkdd and 1st SNA-KDD 2007 workshop on web mining and social network analysis* (pp. 56–65). New York, NY: Association for Computing Machinery. <https://doi.org/10.1145/1348549.1348556>
- Jenkins, H. (2016). Youth voice, media, and political engagement. In H Jenkins, S. Shresthova, L. Gamber-Thompson, N. Kligler-Vilenchik & A. M. Zimmerman (Eds.), *By any media necessary: The new youth activism* (pp. 1.60). New York, NY: New York University Press.
- Kapp, K. M. (2012). *The gamification of learning and instruction*. San Francisco, CA: Wiley.
- Kennedy, G., Judd, T., Dalgarno, B., & Waycott, J. (2010). Beyond natives and immigrants: Exploring types of net generation students. *Journal of Computer Assisted Learning*, 26(5), 332–343. <https://doi.org/10.1111/j.1365-2729.2010.00371.x>
- Kidd, D. C., & Castano, E. (2013). Reading literary fiction improves theory of mind. *Science*, 1239918, 377–380.
- Krapp, A. (1993). *The construct of interest: Characteristics of individual interests and interest-related actions from the perspective of a person-object theory [Studies in Educational Psychology]*. Munich, Germany: Institut für Empirische Pädagogik und Pädagogische Psychologie der Universität der Bundeswehr.
- Krapp, A. (2002). An educational-psychological theory of interest and its relation to self-determination theory. In E. Deci & R. Ryan (Eds.), *The handbook of self-determination research* (pp. 405–427). Rochester, NY: University of Rochester Press.
- Krippendorff, K. (2004). *Content analysis: An introduction to its methodology* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Kurti, R. S., Kurti, D. L., & Fleming, L. (2014). The philosophy of educational makerspaces part 1 of making an educational makerspace. *Teacher Librarian*, 41(5), 8.
- Kuss, D. J., Shorter, G. W., van Rooij, A. J., Griffiths, M. D., & Schoenmakers, T. M. (2014). Assessing internet addiction using the parsimonious internet addiction components model—A preliminary study. *International Journal of Mental Health and Addiction*, 12(3), 351–366. <https://doi.org/10.1007/s11469-013-9459-9>
- Kvale, S. (2008). *Doing interviews*. Thousand Oaks, CA: Sage Publications.
- Lakkala, M. (2010). How to design educational settings to promote collaborative inquiry: Pedagogical infrastructures for technology-enhanced progressive inquiry. (Master's thesis, University of Helsinki, Helsinki, Finland). Retrieved from <https://helda.helsinki.fi/handle/10138/19887>.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge university press.
- Leino, K., Rikala, J., Puhakka, E., Niilo-Rämä, M., Sirén, M., & Fagerlund, J. (2019). *Digiloikasta digitaitoihin. Kansainvälinen monilukutaidon ja ohjelmoinnillisen ajattelun tutkimus (ICILS 2018) [From digital leap to digital skills. International research on multiliteracy and computational thinking (ICILS 2018)]*. Jyväskylä, Finland: Finnish Institute for Educational Research Retrieved from <https://ktl.jyu.fi/fi/julkaisut/julkaisuluettelo-1/julkaisujen-sivut/2019/icils-2018-raportti.pdf>
- Lenhart, A., Kahne, J., Middaugh, E., Margill, A. R., Evans, C., & Vitak, J. (2008). *Teens, video games, and civics: Teens' gaming experiences are diverse and include significant social interaction and civic engagement*. Washington, DC: Pew Internet & American Life Project Retrieved from <http://eric.ed.gov/?id=ED525058>
- Li, R. (2017). *Good luck have fun: The rise of eSports*, New York, NY: Skyhorse Publishing.
- Li, S., Hietajärvi, L., Palonen, T., Salmela-Aro, K., & Hakkarainen, K. (2017). Adolescents' Social networks: Exploring different patterns of socio-digital participation. *Scandinavian Journal of Educational Research*, 61(3), 255–274. <https://doi.org/10.1080/00313831.2015.1120236>.

- Li, S. (2019). Socio-digital participation, friendship and academic support among sixth to ninth graders in Finland. (Doctoral thesis, University of Turku, Finland). Retrieved from <http://urn.fi/URN:ISBN:978-951-29-7733-8>.
- Lonka, K. (2018). *Phenomenal learning from Finland*. Helsinki, Finland: Edita.
- Mania, K., & Chalmers, A. (2001). The effects of levels of immersion on memory and presence in virtual environments: A reality centered approach. *Cyberpsychology & Behavior*, 4(2), 247–264.
- Mannerström, R., Hietajärvi, L., Muotka, J., & Salmela-Aro, K. (2018). Identity profiles and digital engagement among Finnish high school students. *Cyberpsychology*, 12(1), 34–48.
- Marsden, P. V. (2002). Egocentric and sociocentric measures of network centrality. *Social Networks*, 24(4), 407–422. [https://doi.org/10.1016/S0378-8733\(02\)00016-3](https://doi.org/10.1016/S0378-8733(02)00016-3)
- Mäyrä, F. (2007). The contextual game experience: On the socio-cultural contexts for meaning in digital play. In *Proceedings of DiGRA 2007 Conference: Situated Play* Retrieved from [https://e-channel.med.utah.edu/wp-content/uploads/2016/07/digra2007_10.pdf\(810-814\)](https://e-channel.med.utah.edu/wp-content/uploads/2016/07/digra2007_10.pdf(810-814)). Tokyo, Japan: Authors & Digital Games Research Association (DiGRA).
- McCarty, C., Molina, J. L., Aguilar, C., & Rota, L. (2007). A comparison of social network mapping and personal network visualization. *Field Methods*, 19(2), 145–162. <https://doi.org/10.1177/1525822X06298592>
- McCrae, R. R., & Costa, P. T., Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 159–181). New York, NY: The Guilford Press.
- Meerkerk, G. J., Van Den Eijnden, R. J., Vermulst, A. A., & Garretsen, H. F. (2009). The compulsive internet use scale (CIUS): Some psychometric properties. *CyberPsychology & Behaviour*, 12(1), 1–6. <https://doi.org/10.1089/cpb.2008.0181>
- Moisala, M., Salmela, V., Hietajärvi, L., Carlson, S., Vuontela, V., Lonka, K., ... Alho, K. (2016). Gaming is related to enhanced working memory performance and task-related cortical activity. *Brain Research*, 1655, 204–215. <https://doi.org/10.1016/j.brainres.2016.10.027>
- Nardi, B., & O'Day, V. (2000). *Information ecologies: Using technology with heart*. Cambridge, MA: The MIT Press.
- Nedelkoska, L., & Quintini, G. (2018). *Automation, skills use and training*. OECD Social, Employment and Migration Working Papers, No. 202. Paris, France: OECD Publishing. <https://doi.org/10.1787/2e2f4ee4-en>
- Newcomb, A. F., Bukowski, W. M., & Pattee, L. (1993). Children's peer relations: A meta-analytic review of popular, rejected, neglected, controversial, and average sociometric status. *Psychological Bulletin*, 113(1), 99–128. <https://doi.org/10.1037/0033-2909.113.1.99>
- Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, 3(2), 173–182. <https://doi.org/10.1038/s41562-018-0506-1>
- Paavola, S., & Hakkarainen, K. (2005). The knowledge creation metaphor—An emergent epistemological approach to learning. *Science & Education*, 14(6), 535–557. <https://doi.org/10.1007/s11191-004-5157-0>
- Paavola, S., & Hakkarainen, K. (2014). Triological approach for knowledge creation. In *Knowledge creation in education* (pp. 53–73). Singapore: Springer.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Thousand Oaks, CA: SAGE Publications, Inc.
- Peirce, C. S. (1878/2001). Deduktio, induktio ja hypoteesi [Deduction, induction and hypothesis]. In M. Lång (Ed.), *Johdatus tieteen logiikkaan ja muita kirjoituksia [Introduction to the logic of science and other writings]* (pp. 238–254). Tampere, Finland: Vastapaino.
- Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, 37(2), 91–105.
- Perkins, D. N., & Salomon, G. (1992). Transfer of learning. *International Encyclopedia of Education*, 2, 6452–6457.
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1–6. <https://doi.org/10.1108/10748120110424816>
- Przybylski, A. K., & Weinstein, N. (2017). A large-scale test of the goldilocks hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science*, 28(2), 204–215.
- Przybylski, A. K., Weinstein, N., Ryan, R. M., & Rigby, C. S. (2009). Having to versus wanting to play: Background and consequences of harmonious versus obsessive engagement in video games. *Cyberpsychology & Behavior*, 12(5), 485–492.
- Puukko, K., Hietajärvi, L., Maksniemi, E., Alho, K., & Salmela-Aro, K. (2020). Social media use and depressive symptoms—A longitudinal study from early to late adolescence. *International Journal of Environmental Research and Public Health*, 17(16), 5921.
- Rainie, L., & Wellman, B. (2012). *Networked: The new social operating system*. Cambridge, MA: The MIT Press.
- Rajala, A., Hilppö, J., Lipponen, L., & Kumpulainen, K. (2013). Expanding the chronotopes of schooling for the promotion of students' agency. In O. Erstad & J. Sefton-Green (Eds.), *Identity, Community, and Learning Lives in the Digital Age*, 107–125. Cambridge: Cambridge University Press.
- Renninger, A. (2000). Individual interest and development: Implications for theory and practice. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation. The secret for optimal motivation and performance*. New York, NY: Academic Press.
- Renninger, A., Hidi, S., & Krapp, A. (2014). *The role of interest in learning and development*. New York, NY: Psychology Press.
- Renninger, K. A. (1990). Children's play interests, representation, and activity. In R. Fivush & J. Hudson (Eds.), *Knowing and remembering in young children, Emory Cognition Series, Vol. III* (pp. 127–147). Cambridge, MA: Cambridge University Press.
- Renninger, K. A. (1992). Individual interest and development: Implications for theory and practice. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 361–395). Hillsdale, NJ: Erlbaum.
- Rideout, V., & Robb, M. (2018). *Social media, social life: Teens reveal their experiences*. San Francisco, CA: Common Sense Media Retrieved from <https://www.commonsensemedia.org/research/social-media-social-life-2018>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
- Salmivalli, C., Kaukiainen, A., & Lagerspetz, K. (2000). Aggression and sociometric status among peers: Do gender and type of aggression matter? *Scandinavian Journal of Psychology*, 41(1), 17–24.
- Schacter, D. L., Addis, D. R., & Buckner, R. L. (2007). Remembering the past to imagine the future: The prospective brain. *Nature Reviews Neuroscience*, 8(9), 657–661.
- Schiefele, H., Krapp, A., Prenzel, M., Heiland, A., & Kasten, H. (1983). Principles of an educational theory of interest. In Munich, Germany. 7th Meeting of the International Society for the Study of Behavioral Development.
- Schiefele, U. (1991). Interest, learning and motivation. *Educational Psychologist*, 26(2/3), 299–323.
- Schiefele, U. (1999). Interest and learning from text. *Scientific Studies of Reading*, 3(3), 257–279.
- Schiefele, U. (2001). The role of interest in motivation and learning. In S. Messick & J. M. Collins (Eds.), *Intelligence and personality* (pp. 177–214). Hillsdale, NJ: Erlbaum.
- Seitamaa-Hakkarainen, P., & Hakkarainen, K. (2017). Learning by making. In K. Pepler (Ed.), *The SAGE encyclopedia of out-of-school learning* (pp. 421–424). Thousand Oaks: Sage.
- Seo, Y., & Jung, S. U. (2016). Beyond solitary play in computer games: The social practices of eSports. *Journal of Consumer Culture*, 16(3), 635–655.
- The Organisation for Economic Co-operation and Development (OECD) (2019). Future of education and skills 2030: OECD Learning Compass 2030—A series of concept notes. Retrieved from <http://www.oecd.org/education/2030-project/>.

- Thunberg, G. (2019). *Our house is on fire*, <https://www.theguardian.com/environment/2019/jan/25/our-house-is-on-fire-greta-thunberg16-urges-leaders-to-act-on-climate>: The Guardian Retrieved from <https://www.theguardian.com/environment/2019/jan/25/our-house-is-on-fire-greta-thunberg16-urges-leaders-to-act-on-climate>
- Trepte, S., & Reinecke, L. (2011). The pleasures of success: Game-related efficacy experiences as a mediator between player performance and game enjoyment. *Cyberpsychology, Behaviour and Social Networking*, 14, 555–557. <https://doi.org/10.1089/cyber.2010.0358>
- Trepte, S., Reinecke, L., & Juechems, K. (2012). The social side of gaming: How playing online computer games creates online & offline social support. *Computers in Human Behaviour*, 28, 832–839. <https://doi.org/10.1016/j.chb.2011.12.003>
- Twenge, J. M. (2017). *iGen: Why today's super-connected kids are growing up less rebellious, more tolerant, less happy—and completely unprepared for adulthood—and what that means for the rest of us*. New York, NY: Simon and Schuster.
- Twenge, J. M. (2018). *Have smartphones destroyed a generation?* Vol. 2017. The Atlantic. <https://www.theatlantic.com/magazine/archive/2017/09/has-the-smartphone-destroyed-a-generation/534198/>
- Valkenburg, P. M., Peter, J., & Walther, J. B. (2016). Media effects: Theory and research. *Annual Review of Psychology*, 67, 315–338. <https://doi.org/10.1146/annurev-psych-122414-033608>
- Warden, D., & Mackinnon, S. (2003). Prosocial children, bullies and victims: An investigation of their sociometric status, empathy and social problem-solving strategies. *British Journal of Developmental Psychology*, 21(3), 367–385.
- Wellman, B. (2007). Challenges in collecting personal network data: The nature of personal network analysis. *Field Methods*, 19(2), 111–115. <https://doi.org/10.1177/1525822X06299133>
- Wenger, E., White, N., & Smith, J. D. (2009). *Digital habitats: Stewarding technology for communities*. Portland, OR: CPsquare.
- Wigfield, A., Tonks, S., & Eccles, J. S. (2004). Expectancy value theory in cross-cultural perspective. *Big Theories Revisited*, 4, 165–198.
- Williams, S. (2002). *Free as in freedom: Richard Stallman's crusade for free software*. Sebastopol, CA: O'Reilly Media, Inc.

How to cite this article: Kruskopf M, Hakkarainen K, Li S, Lonka K. Lessons learned on student engagement from the nature of pervasive socio-digital interests and related network participation of adolescents. *J Comput Assist Learn*. 2020; 1–21. <https://doi.org/10.1111/jcal.12506>