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Learning Potential in Youth's Online Networks: A Multilevel Approach

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Learning Potential in Youth's Online Networks: A Multilevel Approach

1. Introduction

Youth around the globe frequently visit Social Networking Platforms (SNPs) such as Facebook, MySpace, LiveJournal, Reddit, YouTube, Twitter, etc. This rich variety of SNPs, the increasing technological possibilities to access them -mobile or otherwise- and demographics regarding online activities indicate the popularity and significance of these platforms in young people's lives (e.g., Madden, Lenhart, Cortesi, Gasser, Duggan & Smith, 2013). Youth often make use of SNPs for social purposes; they replicate their existing offline social relationships on these platforms, but also meet new people and make connections beyond their local communities (Ito, Baumer, Bittanti, boyd, Cody, et al., 2010). In terms of socialization SNPs provide a space for young people to safely explore their peer culture, to give and receive feedback regarding digitally constructed self-representations, and to show and seek affection, affirmation and acceptance (Larsen, 2007). These networked spaces are as varied as their friends' profile pages, profiles pages of political parties, sports' and fandom clubs and so on. While youth explore SNPs they are often exposed to a wide range of information and a variety of resources which are claimed to be indicative of the learning potential that SNPs offer (Jones & Steeples, 2002; Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006; Lankshear & Knobel, 2006).

Studies that make an explicit connection between learning and networking platforms often focus on formal learning e.g., virtual learning environments, online distant courses (e.g., Hodgson, McConnell & Dirckinck-Holmfeld, 2012). Studies that focus on youth cultures and learning often include the role of SNPs, but again mostly focus on how the academic learning is enriched by utilizing SNPs (e.g., Erstad, 2005; Erstad, Gilje, Sefton-Green & Vasbo, 2009; Kumpulainen, Mikkola & Jaatinen, 2013). These studies show that youth use SNPs and other Internet knowledge facilities (e.g., wiki's) often for school-related learning and that schools increasingly employ these platforms to promote and improve collaboration among pupils. However, the potential benefits of SNPs for learning go beyond the fulfillment of academic requirements; emerging online social practices such as the collective tagging of information (e.g., Reddit) or altruistic knowledge sharing (e.g., wiki's) are increasingly common practice for most youth. Youth have more agency than ever to be connected to the world, share ideas and experiences, develop and show expertise in their respective fields of interests (Ito, Gutiérrez, Livingstone, Penuel, Rhodes, et al. 2013). Unfortunately, this informal learning

potential is hardly acknowledged by educators and parents, while youth themselves increasingly realize that tapping into this potential effectively, is giving them access to self-directed, life-long learning.

Since SNPs are not specifically designed for learning or teaching purposes they lack formal instruction and assessment. There are no clear-cut measures to show that people learn from participating to these online networks. However, there are endless opportunities for interaction with other people and artifacts, and for participation in a wide range of communities that can provide expertise or can serve to explore new interests or knowledge. People can ask questions, give feedback, explore interests, inspire others, create, edit, circulate and comment on all kinds of digital content and artifacts (Lankshear & Knobel, 2006). From the perspective of socio-cultural learning theories such environments can provide relevant and valuable learning opportunities (Erstad, 2012; McLoughlin & Lee, 2007).

Socio-cultural approaches to learning, in line with Vygotsky's ideas (1978), provide the base to understand learning as a situated and social phenomenon that is inseparable from the socio-cultural context in which it occurs (Wertsch, 1998). In this view learning occurs as a result of the interaction between cognition and culture when an individual engages in the culturally defined activities with social others (Lave & Wenger, 1991). Vygotsky claimed that our interactions with the 'external' are the starting point of all internalized or individually appropriated knowledge and skills (Cole, 1996). These interactions are always mediated through the available psychological, cultural and material tools (e.g., language, signs, symbols, items in the physical surrounding) (Cole & Wertsch, 2004). We are, and our learning is too, always informed by the tools available to us while we (inter)act with the world. In the digital era, the notion of mediation gains a new meaning. Digital tools, like any other cultural tools, mediate our self-representation, communication and understanding of the world. However, the networked nature of these tools, as well as the activity systems that build upon them, ask for a rethinking of mediated activity and how new forms of mediation shape individual learning, social change and development (Leander & Haan, 2010). The current study claims that both the SNPs and the technological materials to access these platforms (i.e., computers, mobile phones) are embedded in the contemporary youth cultures as mediators that promote unique learning opportunities.

In order to understand how SNPs facilitate learning from a socio-cultural perspective we need to take a closer look at the interactions that are generated by SNPs. Although the technical affordances SNPs offer are crucially important, these interactions depend on and are also shaped by the people who are engaging in the interaction. There are some common elements of online networking platforms that create specific patterns of interactions (boyd, 2008; McLoughlin & Lee, 2007). SNPs require a 'profile' i.e., a personal page with some information about the individual such as tastes, friends list as well as digital artifacts like photos uploaded or shared by the individual. Profile pages are a means for youth not only to exhibit their digitally constructed selves, but also to observe that of others (boyd, 2008). SNPs enable its users to comment on shared items, users can edit these items and communicate about them with others within their network. By engaging in these interactions youth actively contribute and shape the content of SNPs, they gain social and communicative skills and develop digital literacies (Gee, 2004; Lankshear & Knobel, 2006). The possibilities to share ideas with each other, ask questions, give advice or feedback are abundant in SNPs (Ito, et al., 2010; Jenkins, et al., 2006; Larsen, 2007) and the content of these interactions may vary from the latest 'cute cat video' to promoting an important social cause (Cohen, 2009).

The interdependencies between individuals and their networks also play a significant role in structuring the learning experiences of young people and defining, to some extent, the kinds of online interactions and information flows that take place in the SNPs (Diepstraten, du Bois-Reymond & Vinken, 2006). While in theory SNPs might facilitate rich opportunities for learning, in practice not every person's network is rich in resources; the content of the circulated information, the frequency of interactions may vary substantially between people. And, there is evidence that this difference also is shaped by demographic characteristics such as class and ethnicity (e.g., McPherson, Smith-Lovin & Cook, 2001). We have limited information on with-whom youth interact when they are online in SNPs and how characteristics of the person relate to those of their contacts. This so called 'with-whom' question is important because individuals are influenced by the social groups to which they belong, and the properties of those groups are in turn influenced by the individuals who make up that group (Hox, 2010).

The purpose of this study is to understand how the above mentioned SNP characteristics mediate learning experiences of youth from the perspective of youth themselves. To this end, we provide first, a detailed response to the 'with-whom' question and second, address how

these network characteristics again mediate the network interactions considered typical for SNPs, such as keeping in touch, sharing digital artifacts, asking for advice, give feedback and edit and create digital content. Lastly, our goal is to investigate whether these network characteristics and SNP activities together can predict what we call 'perceived learning' in the eyes of the youth themselves. This will be achieved by taking a close look at the networks of youth in the Netherlands and by applying the ego-network methodology as explained below.

Ego-Network Approach

As a method within the social network analysis tradition, ego-networks focus on the individual at the centre of his/her network and map his/her direct relationships (Alexander, 2009). An ego-network consists of an *ego* (i.e. the individual) and *alters* (i.e., contacts) connected to ego, and *ties* representing the relationships within the network (Borgatti, 1998). The ego-network method conveniently enables the storing of information about network members (e.g., age and gender of both the ego and alters) in the same dataset as information about the ties between the alters and ego (e.g., the regularity of sharing, asking questions, editing artifacts) (Garton, Haythornthwaite, Wellman, 1997). By doing so, it facilitates the analysis of the kinds of interactions that occur between people in relation to personal or network attributes (e.g., girls give each other more feedback or heterogeneous networks have more sharing activity). In order to tackle the ego-network analysis two kinds of data are relevant: the composition and the structural characteristics of networks.

Ego-Networks' Composition & Structure

The composition of ego-networks may cover a large variety of factors to describe the relationship between the ego and alters. It entails information about the similarity between ego and alters regarding socio-demographic variables (e.g., gender, age, and ethnicity) and additional information in line with the research goals such as the role of the alter in ego's life, frequency of meeting with each other, how close the relationship is, if they consult each other and so on (e.g., Garton, et al., 1997; Röper, Völker & Flap, 2009). Earlier research has documented that people have a tendency to prefer building relationships with others who are similar in certain demographic attributes like gender, age, ethnic and racial background, socio-economic status and education level; a tendency known as homophily (see for an extensive review McPherson, et al., 2001). While the face-to-face relationships are influenced by a range of factors, in SNPs there may be additional or different factors at play.

It is suggested that the online world is creating different dynamics in building relationships (Ito, et al. 2013), also in the domain of learning and socialization. SNPs have rendered some of the traditionally crucial variables such as geographical proximity to a mere detail and it is argued that people are no longer bound to their local communities for socialization (Rainie, Rainie & Wellman, 2012). Furthermore, traditionally rigid social boundaries (e.g., between celebrities and their fans, politicians and their followers or between people from different socio-economic classes) became easier to cross and the threshold for reaching to others in general is significantly dropped at least in the virtual world (e.g., Madden, et al., 2013). It is also claimed that shared interests between people, who are otherwise dissimilar, facilitates the formation of a learning tie, here defined as a tie which is perceived by the participants as relevant and useful for their learning (e.g., Ito, et al., 2010 & 2013; Rainie, et al. 2012). These claims regarding emerging online networked constellations suggest that people have more flexibility in addressing their social and learning needs. SNPs enable people to choose the topics they want to learn and share, the people they like to communicate with and with control of the pace of communication, so it is argued.

On the other hand there is evidence that the preference for building relationships with similar others still continues on SNPs. For instance, research on friendship ties in MySpace shows homophily trends for ethnicity, religion, age, but not for gender (Thelwall, 2008). Likewise, Singla and Richardson's study about instant messaging (2008) concluded that similarity between people in terms of age, location, and subjects of interest played a significant role in explaining the instant messaging ties. A large scale study among American teenagers showed that teens were more likely to interact with people of the same race and their online practices, online displays of tastes and norms were largely influenced by the people they interacted in SNPs (Madden, et al., 2013). These results show that although online environments bear the potential for widening the life-worlds of youth by creating opportunities to connect with a wider public, as is often argued, youth's networking practices show a tendency to connect with similar others. This has important consequences for the learning opportunities online networks offer: while access to diverse groups is often associated with varied information and a higher learning curve, homogeneous groups are known to circulate similar ideas, messages and artifacts (Haythornthwaite, 2006; Rainie, et al. 2012).

Current Study

This study is part of a larger, multi-disciplinary research project that studies identity formation and learning in the modern digital world, both for Dutch youth and youth from different ethnic minorities living in the Netherlands. The ideas behind our focus in ethno-cultural diversity were firstly to investigate whether both minority and majority youth were equally aware and taking advantage of the learning potential in SNPs and secondly to observe whether minority youth's (or their families') immigration background had influenced the composition and structure of their ego-networks and whether these different network constellations (in terms of migration ties) have an impact on these young people's learning experiences. Besides the ethno-cultural variety, we also took into account various secondary education levels in the Netherlands. Education level was included in the analyses to find out if educational track impacted upon their networks and online learning experiences. In addition we have taken several other socio-demographic variables (i.e., gender, age) and a variety of attributes of relationships which can be assumed to predict network activity and networked learning experiences (e.g., the location of contacts, the frequency they meet each other). All variables that were used are explained in detail in the method section.

Using multiple methods (i.e., survey and interviews) we explored the relationship between *the structure and composition of youth's online ego-networks,* and *their network activities* as well as *their perception of the learning potential in SNPs*. Here, we present a section from our survey, which was the first phase of the data collection of this project. To the best of our knowledge there have not been any studies that attempted to quantitatively measure network activities and perceived learning potential in SNPs over large and ethnically diverse samples of youth. This research forms an initial step to create hypotheses regarding the nature of the (online) ego-networks of ethnically diverse youth groups as well as regarding how these online social structures contribute to the learning experiences of young people. Guided both by the literature on factors explaining the online networks of youth and on SNPs and their assumed learning potential, we took into account a wide variety of personal attributes, compositional and structural features of ego-networks. We investigated how these might impact upon a number of specific network activities that are claimed to facilitate opportunities for learning. Furthermore, we explored whether online network constellations differ among different minority groups and majority youth in the Netherlands. Finally, in line with the assumptions in the literature that was discussed, we investigated whether youth experience their network activities as relevant for their learning by asking for youth's perception of the

learning potential in SNP's. The variables that were used are explained in detail in the next section. The following research questions guided our research:

Q1. (How) Does youth from different ethnic backgrounds differ from each other regarding the compositional and structural characteristics (i.e., homogeneity and density of networks, relationship characteristics) of their ego-networks?
Q2. Which personal attributes, compositional and structural features of ego-networks can predict typical network activities associated with the learning potential in SNPs?
Q3. Which personal attributes, compositional and structural features of ego-networks can predict the perceived learning potential in SNPs?

2. Methods

2.1. Sample

The survey was carried out in 2010 among 1408 youth in seven secondary schools in the Netherlands. Of this sample, 1227 participants (87%) who reported to have active online networks were included in this study. Virtually all participants had access to the Internet in their homes (99%). The sample age was 12-18 (M=14.4, SD=1.54). The data set contains information on 6135 network contacts (alters) of 1227 participants (ego). Table 1 shows the distribution of gender, ethnicity and generation, and education level of the participants and the socio-demographic descriptions of alters.

-Insert Table 1 here-

Participants from various ethnic backgrounds were collectively labeled as 'other ethnicities' which consisted of mainly South-American, Middle Eastern, and African participants. Europeans and children from a mix of ethnicities were the smallest groups within this category.

2.2. Instrument and Data Collection

The survey instrument was developed using NetQ survey software (http://www.netq-survey.com). It consisted of six sections and served as an exploration tool for a wide range of behaviors, attitudes, preferences of youth's internet use as well as the involvement of others in these experiences. It was validated after a two-step intensive piloting. An initial set of ideas, questions and multiple-choice answer categories were adjusted on the basis of feedback from 15 young people from the target population. They were asked whether the questions and

answer categories were clear, whether they missed answer categories and whether they understood the structure of the survey. Subsequently, the questions and answer categories were refined and were checked again with a group of 20 young people.

In the current article we are presenting the data mainly from the network section of the survey. This section was modeled partly after the network section of the General Social Survey (see http://www.norc.org/gss+website, 02-10-2011). The data collected in this section measured the backgrounds of the *five most active contacts* (i.e., alters) of each participant. Per network contact the participants answered questions that would describe the person (e.g., How old is [Contact 1-5]? Where does [Contact 1-5] live?) and the relationship (e.g., How often do you meet [Contact 1-5] online? How personal is your relationship with [Contact 1-5]?) and the network interactions with each other (e.g., How often do you [keep in touch/share digital artifacts/ask for advice/give feedback/edit and create digital content/discover new information and websites] with your [Contact 1-5]?).

2.2.1. Measurement of the Dependent Variables

We identified 6 network activity items that involve interactions with contacts. The participants answered per alter the frequency with which they were: (1) keeping in touch (with email, profile pages, instant messaging), (2) sharing/exchanging digital artifacts, (3) editing/creating digital artifacts, (4) asking for advice, (5) giving feedback, and (6) discovering new information, technologies, and websites. Our choice of these activities reflects a socio-cultural perspective on learning in which social interaction (keeping in touch), the exchange of tools and resources (sharing artifacts and information), productivity (editing/creating), elements of scaffolding (asking for advice and giving feed-back) are represented. The last item that referred to the 'discovery' of new information was designed to measure youth's perception of whether they experienced the online relationship as a relationship which they considered relevant for their learning. The frequency of each of these activities was measured with a scale: 1='*almost never'*- 2='*monthly'*, 3='*2or3 times per month'*, 4= '*2or3 times per week'*, 5='*daily*'.

For our second question we have tested which items predicted network activities in SNPs. The use of the learning potential is defined by the first five network interactions items listed above. In order to have a single outcome variable out of the five items we tested for scale reliability and conducted an Exploratory Factor Analysis (EFA). Cronbach's alpha score for

scale reliability was sufficient α=.82. EFA resulted in one factor solution. The Kaiser-Meyer-Olkin measure of sampling adequacy was above .80 and Bartlett's tests of sphericity were significant (χ^2 (15) = 840.26, p<.001). So, a composite score per alter, consisting of the average of all network activities was computed as the dependent variable. For our third question we have tested which personal attributes, compositional and structural features of ego-networks were predicting the perceived learning potential (i.e., 'discovery of information'). For this question the network interaction items were used individually as predictors.

2.2.2. Measurement of Independent Variables

The independent variables were measured on two different levels: ego and network. The first level refers to the information about the participants and the second level is about the alters and the overall structure of the ego-networks of our participants.

Ego Level Variables

Gender was a categorical variable with boys as the reference group. *Ethnicity* was measured by parental country of birth (categories were Netherlands, Turkey, Morocco, Surinam, Aruba/Dutch Antilles, and Other (open response)) and languages spoken at home (Dutch, Turkish, Arabic, A Berber language, Papiamento, English, French, Spanish, Other). *Generation* of the participants was measured by the participants' and parents' country of birth. If both parents and the participant were born in the country of origin they were considered as first generation; if one or both parents were born in the country of origin, but the participant in the Netherlands they were considered second generation. In order to differentiate between a possible 3rd generation migrant and Dutch descent participants we have checked the language they speak at home (i.e., migrant descent youth often continue to speak the 'native language' besides Dutch language) and found no 3rd generation minority participants in our sample. *Age* was measured in years. *School level* was categorical and reflected four main levels of secondary education in the Netherlands respectively 'vocational', 'higher preparatory', 'higher general continued', and 'pre-university secondary' education.

Network Level Variables

We collected information on the *gender* and *ethnicity* of the alters (Dutch, Turkish, Moroccan and Other). *Homogeneity* of gender and ethnicity was based on similarity between egos and alters and the values could vary between '0'-'5' (i.e., between 0% and 100%). For the

descriptive/comparative analyses we have reduced the number of categories to three by leaving '0' and '5' intact and combining the in-between categories in order to reflect the details of ethnic and gender homogeneity concisely. *Age of alters* was collected with an open question; the open information was than categorized into peers (12-18), younger and older generations in comparison to our participants.

Geographical dispersion was based on the alters' location the range of distance varied from '1' to '5': 'the same house', 'the same neighborhood', 'the same city', 'somewhere else in the Netherlands' to 'outside the Netherlands'. *Type of relationship* captured whether the online network contact was a family member, a friend or an acquaintance. *Off- and online contact* meeting frequencies were measured on a five point scale varying from 'daily' to 'once a month or less'. In offline meeting frequency we have added the category 'I never met this contact in person' to find out any 'only online' relationships. *Experienced emotional closeness* was a question to measure the emotional strength of a relationship. On a five point scale the participants rated the emotional closeness they felt for each one of the network contacts.

Topics they talk about Online conversation topics were captured with a dichotomous (yes-no) 17-item list of topics. The items varied from casual daily issues (e.g. school events, family matters, making appointments) to more specific interests (e.g. how to use new gadgets, fashion and celebrities, history, science, etc.). These items were grouped as socially-driven (9 items) and interest-driven (8 items) subjects for parsimony of analyses. The Cronbach's alpha scores for socially-oriented (9-items) and for interest-driven topics (8-items) were respectively .93 and .94. A confirmatory factor analysis performed with *Mplus* showed the following acceptable fit indices for the two-factor solution in comparison to the baseline model: $\Delta\chi 2 = 29090.52$, $\Delta df = 66$, CFI = .790, TLI = .783 and RMSEA = .056. Finally, *density* was computed by the ratio of alters who actually knew each other to the total amount of possible relationships in each ego-network.

The survey was administered in the computer rooms of the schools. Before the survey sessions, instructors explained the general aims of the survey. During the surveys, the instructors remained present to supervise and monitor the survey process and answer any questions. Most survey rounds took 30 to 40 minutes.

2.3. Data Analyses

The first research question was answered by descriptive and comparative analyses using SPSS software. Chi-square tests of independence were performed to compare the network composition among different ethnic groups; correlation between online and offline meetings with the contacts was reported; analysis of variance was performed for the emotional closeness, topics talked online and density scores to check for differences between different ethnic groups. The second and third questions were answered by Multilevel Regression Analyses (MLA) using MLwin2.02 (Rasbash, Charlton, Browne, Healy & Cameron, 2005).

With MLA it is possible to study both the influence of individuals *and* the social structures the individuals are embedded in (Hox, 2010). MLA models take into account the interdependencies between people and their relations in a nested structure. In ego-network analysis this structure is such that alter and network characteristics (i.e. level one, henceforth mentioned as 'network-level') are nested under egos (i.e. level two, henceforth mentioned as 'ego-level'). This structure enables us to study the variance parameters *within* ego-networks (i.e. differences per alter) and *between* ego-networks (i.e. differences per ego-network) (for further details refer to van Duijn, van Busschbach & Snijders, 1999).

To prepare the data for multilevel modeling we have centered all ordinal and continuous variables in order to make the effects of these variables more easily interpretable and reduce/overcome multicollinearity issues (Hox, 2010). Multicollinearity occurs when independent variables strongly correlate -we observed this effect for network activity items and meeting frequencies-; this causes inflation of the regression coefficient estimates, overestimating the impact of independent variables on the dependent (Hox, 2010). In this study, due to the large sample size (i.e. 1227 egos and 6135 alters) and the acceptable variance inflation factors (VIF) which were all below 5 and tolerance levels above 0.20 (Williams, 2011), the network interaction items remained intact and were used as predictors for the analysis of third question. In MLA's ethnic groups were compared to each other by contrasting each ethnic group to the other ethnic categories.

We performed the same steps in testing models for both 2nd and 3rd research questions. First, we established that the nested model provided a better fit to the data than a simple regression. A nested structure was confirmed respectively for the 2nd and 3rd research questions [$\Delta\chi2$=534.142, Δdf =1, p<.001; $\Delta\chi2$ =2233.76, Δdf =1, p<.001]. We also tested for any third level influences of schools in comparison to the nested model and found no significant value

of 3rd level respectively for the 2nd and 3rd research question [$\Delta\chi2=1.75$, $\Delta df=1$, $p=.18$; $\Delta\chi2=3.6$, $\Delta df=1$, $p=.06$]. Second, we checked the divide of the total variance of the network activities (2nd question) and perceived learning potential (3rd question) between ego and network levels. We then entered all predictors of network-level and we also tested whether there were significant within level interactions of network composition (e.g., geographic dispersion) with network structure (i.e. density). Non-significant predictors (based on Wald's test) were excluded from the model and we tested whether the model-fit deterioration due to leaving out the non-significant variables was significant. Next, we entered the ego-level variables to the remaining significant network-level predictors and performed the same steps as above. Finally, we checked for relevant random slopes (i.e., unexplained variability between egos in the effect of an alter/network characteristic) and cross-level interactions (i.e., a combined variable of network- and ego-level).

3. Results

Q.1. The first question is answered primarily with descriptive accounts of youth's ego-networks. The overall picture of online network contacts showed a strong preference for friends. The participants named predominantly their peers and there were no differences between different ethnic groups regarding the age of their network contacts. There was a general tendency for same-ethnicity and same-gender contacts. The majority of all alters were local (i.e., from same neighborhood or city) and they were emotionally close ties. Participants talked about a wider range of socially-oriented topics in comparison to interest-driven topics. These general trends were compared among different ethnic groups in our sample. The results of the chi square test of independence are presented in Table 2 below.

-Insert Table 2 Here-

In terms of *gender homogeneity* we observed overall a high preference for same-gender contacts, but this tendency was significantly stronger with more 'completely homogenous' same-gender networks among Turkish and Moroccan participants than in the Dutch and Other participants' networks. Regarding *ethnic homogeneity* we observed again an overall preference for sameness, but in general Moroccan and Other networks were showing more ethnic variation; Turkish and Dutch networks had significantly stronger tendency for 'completely homogenous' same-ethnicity networks (Dutch even more than Turkish).

The results of the chi square tests show differences in several interesting aspects. Regarding the *geographical dispersion* of alters we see that ethnic groups did not differ from each other regarding the number of people they named 'living in the same house' and 'living in the same city'. However, Turkish and Moroccan networks had significantly more contacts 'living in the same neighborhood' and significantly less contacts 'living in the Netherlands' than Dutch and Other networks. Regarding the network's reach around the globe Turkish and Other networks had significantly more contacts 'outside the Netherlands'. Regarding the composition of *relationships* Turkish and Moroccan youth's networks were comparable in the amount of 'family' and 'friends'; they named significantly more family members and less friends than the Dutch and Other group.

Regarding the frequencies of *online and offline meetings* we found a great overlap. The two meeting frequencies significantly correlated (r=.44; p<.001). The ethnic groups did not differ in the online/offline meeting frequencies. Only a small number of alters (2.4%) were only met in the online environment and never in person.

Ego-alter relations were mostly characterized as *emotionally close ties.* Turkish youth had overall the most emotionally close networks (65.1%) followed by 'Other' ethnic group (56.7%), Moroccan (48.6%) and Dutch (48.2%). The ethnic differences were significant [χ2=119.61, df =12, p<.001].

Participants talked about a wider range of *socially-oriented topics* in comparison *to interest-driven topics.* Among the 9-item list of *socially*-oriented and 8-item interest-driven topics the average amount of items egos talked with alters were, respectively, M=3.6 (SD=2) and M=1.5 (SD=1.6). Socially-oriented topics are thus more popular in these online relationships.

Finally, *the density of relationships* in ego-networks was relatively high in all ethnic groups (Dutch M=.62, SD=.32; Turkish M=.66, SD=.31; Moroccan M=.69, SD=.30; Other M=.63, SD=.33). However, the differences were significant (F (3, 1223) =3.61; p<.05).

Q.2. In order to predict the Network Activity (NA) we used the composite score of network interaction items as our dependent variable as explained above (p.8). The variance of NA was divided between 59% for the ego-level and 41% for the network-level. In other words, 59% of network activities were attributed to the differences between egos' and 41% to networks' characteristics. The models we tested and the unstandardized (B-scores) and standardized (β

beta-scores) regression coefficients of significant predictors and interactions are presented in Table 3. The significant variables reported in the table below can be interpreted in light of β scores; they indicate the amount of change on the dependent variable (i.e. 'network activity') at 1 standard deviation change on the predictor variables.

-Insert Table 3 Here-

The baseline model with no predictors had a *deviance* of 17621.34 with an intercept B_{0ij}=2.609, (*S.E.* =.042) network-level variance=.771(.016) and ego-level variance=1.130 (.053). In the first model we added all network-level variables and relevant within level interactions (i.e., interactions between structure (density) and composition (tie attributes)). The model fit improved significantly ($\Delta\chi2$=823.95, Δdf =20, p<.0001).The second model contained significant variables from Model 1 and all ego-level predictors; we controlled for the significance of these new predictors as well as any changes in the significance of network-level variables. We have then removed the non-significant ego-level variables and the model fit in comparison to Model 1 was still significantly better ($\Delta\chi2$=19.175, Δdf =2, p<.0001). Our third model had only significant network- and ego-level predictors and we tested whether random slopes explained the variance of NA between participants. Two random slopes were significant, showing that the *emotional closeness* with alters and the *gender of the alter* carry different weights for different participants. The covariance of alter gender with the intercept was significant and it improved the model significantly ($\Delta\chi2$=5.98, Δdf =1, p<.05); covariance of emotional closeness was insignificant therefore removed from the model. The final model showed the best fit to the data ($\Delta\chi2$=156.623, Δdf =6, p<.001).

Model 3 shows that the most important predictor of the NA is, logically, the '*frequency of online meetings'* (β=-.14; p<.001); the more youth spend time online, the more likely they would engage in networking activities. Second, we found that the variety of both '*socially-driven'* and '*interest-driven*' topics between ego and alters significantly predicted NA. On the network-level the gender and age of alters were significant, indicating that there was more network activity with female alters, but less with older alters. Finally, on the network level both the '*emotional closeness*' towards the alter and '*frequency of offline meetings'* predicted NA positively and significantly. We have controlled whether the density as a structural attribute interacted with network composition items and found a significant interaction effect with the amount of '*interest-driven*' topics (β=.03; p<.01). This finding shows that other

factors being equal there is a higher likelihood to make use of the learning potential in dense networks where people's conversation revolve around their interests.

The significant ego-level variables revealed that girls were engaging in network interactions more and compared to the lowest secondary education level (i.e., vocational) participants from the higher levels (i.e., higher general continued and pre-university) were less likely to make use of SNPs learning potential. Random slopes showed that the variance between the participants was also explained with random effects of emotional closeness and gender of the contacts. That is, there are individual differences in the way people engage in network activities in SNPs with emotionally close or distant, and with female or male contacts. Based on our final model 14% of the variance at ego-level and 8% at network-level were explained.

Q.3. In our model that predicts the Perceived Learning Potential (PLP) the variance was divided between network and ego (46% to 54%, respectively). So, 54% of 'perceived learning potential' was due to the differences between egos' and 46% to networks' characteristics, which points to the importance of network aspects in shaping the participants views about the learning in SNPs. The baseline model with no PLP predictors had a *deviance* of 19643.604 with an intercept B_{0ij}=2.526, *S.E.* = (.036), network-level variance= 1.135 (.024) and ego-level variance=1.317 (.063). Table 4 shows the tested models, unstandardized (B-scores) and standardized (β beta-scores).

-Insert Table 4 Here-

All network-level variables were entered and the model fit improved significantly ($\Delta\chi2$=651.729, Δdf =15, p<.001). Except for '*density*' all predictors were significant. With our second model we added both the ego-level variables and the network interaction items, which improved the model fit greatly ($\Delta\chi2$=5319.55, Δdf =8, p<.0001). The remaining significant predictors from the network-level were the frequency of '*offline meetings'* (β=.04; p<.05), *´emotional closeness'* (β=-.02; p<.05) and the variety of 'socially-*driven'* (β=-.02; p<.05) and '*interest-driven*' (β=.04; p<.001) topics. These results show that a high amount of social topics and a high score in emotional closeness in SNPs are detrimental to PLP.

Due to their design, network interaction items already inherently place the cross-level interactions between participants and alter into the analysis. Therefore it is not surprising to see these variables as the strongest predictors of PLP (respectively '*sharing/exchanging'*,

'*giving feedback'*, '*asking advice'*, '*editing/creating'* and '*keeping in touch'*). Regarding ego-characteristics we found that gender of ego was a significant, but negative predictor (β=-.04; p<.001), which indicates that girls report less PLP. The comparisons between the four ethnic groups revealed that as a general trend Moroccan participants scored higher in PLP than the other groups. Although this difference was only significant when compared to Dutch youth (β=-.07; p<.001) and other ethnic categories were not substantially different from each other. For the final model random slopes were tested and we did not find significant random effects of network-level variables. Although *alter gender* was not significant we kept the variable in the model so that we could check cross-level interactions between socio-demographic variables of ego's and alters. The gender interaction was significant and significantly improved the model ($\Delta\chi 2$=9.021, Δdf =1, p<.01) indicated that female participants interacting with female alters were more likely to score higher in PLP, even though the fixed effect of ego-gender resulted in significantly less PLP scores for female participants than their male peers. The final model explained 71% of the variance in total, with 45% on the ego-level and 26% on the network-level.

4. Discussion & Conclusions

We set out to study the ego-network compositions of diverse ethnic groups of youth in the Netherlands, how this youth was engaging in network activities and whether they perceived these interactions as relevant for their learning. We have adopted a socio-cultural theoretical perspective on learning. This theory, which is established long before networked technologies became common-ground, is still relevant for its emphasis on the interaction between culture and cognition (Erstad, 2012). However, the current cultural context demands to take the online social interactions into account, since they channel the development of youth's mind and have the potential to facilitate their learning. We have primarily looked at how specific types of interactions in SNPs occur within ego-networks of ethnically diverse youth groups and whether these interactions are interpreted by the youth themselves as relevant for their learning.

Regarding the ego-network composition and structure we found that the most frequently contacted people in youth's networks formed a homogenous group. The location of people was an important factor in the composition of the networks; the majority of alters were living at a small distance from the ego. However, Turkish youth and the 'Other' group had more contacts living outside the Netherlands compared to their Dutch and Moroccan peers. The

relationships were dense and typically experienced as emotionally close. Young people are thus taking what could be called their locally based, mainly homogeneous offline communities to the online domain, and prefer to use the opportunities they have to go online to strengthen their offline ties.

This overall trend in ego-network composition support earlier findings that the homophily tendency is still remarkably important also in forming online relationships (e.g., McPherson, et al., 2001; Singla & Richardson, 2008; Thelwall, 2008) and that youth often replicate their offline network in online platforms (Ito, et al., 2010). Furthermore, the homophily effect might be stronger during adolescence and thus be temporary. During this phase 'being similar' allows for a safe exploring of the world as well as for strengthening the feeling of belonging. It may be that the most relevant learning experiences channeled via SNPs during the teenage years are those that evolve around their (immediate) peer culture, its norms and values and is a significant part of youth's identity development and socialization (Larsen, 2007).It is to be expected that their online networks become more individualized and de-standardized later in their life course (Stauber & Walther, 2006).

It should also be noted that not all networks were equally homogeneous; a small fraction of all online contacts were consisting of people that were different from the ego, even in some cases people the participants never met in person. This is remarkable given that these acquaintances made it to the 'top-five' in ego-networks. So, while similarities prevailed over differences, there was also diversity in youth's networks.

Through detailed comparisons of the various ethnic groups we found that certain patterns significantly differed per group. In general, Turkish and Moroccan youths' ego-network compositions were more comparable to each other. Both were significantly more family oriented, they had most contacts in the neighborhood, and they were more gender coherent than the Dutch and the 'Other group'. This finding highlighted the importance of local communities for online interactions and may have implications for the learning experiences of Turkish and Moroccan youth. The overall picture indicated that youth's networks consist mostly of close-knit and homogenous groups for all ethnic groups in our sample. Even though from a network perspective homogeneity is often associated with lack of new information, there are also reports that youth with a migration history benefit from homogeneity for

upward social mobility (Ryabov, 2009) or academic achievement (Morgan & Soerensen, 1999).

By means of MLA we could differentiate between how individual and network characteristics, and the intersections thereof had an impact on network activities and the perceptions of youth on the learning potential in SNPs. The divide between the variances of our two dependent variables -network activities and perceived learning potential in SNPs - underpin that if we want to understand how young people learn in SNPs, as well as why they opt for the SNPs for learning, merely looking at the individual level is not enough. This result clearly shows empirically that learning is a relational phenomenon and points to the relevance of the study of networks when we want to understand why and how people learn.

In our inquiry for 'network activities' we found that both compositional and structural network characteristics played a significant role in predicting the frequency of these activities. The perceived learning potential was predominantly predicted by network interaction items, indicating the more active the youth are, the more value they deem to their online interactions. Reflecting on Jones and Steeples' statement (2002) that 'learning in networks is a likely result of frequent network activity', this finding confirms that being engaged regularly in network interactions that entail a shared focus (keeping in touch), the exchange of tools and resources (sharing artifacts and information), productivity (editing/creating), elements of (asymmetric) scaffolding (asking for advice) and peer feed-back (giving feed-back), substantially impacted on the extent to which youth perceive these activities are relevant for their learning. Thus, the more these activities happened, the more (perceived) learning occurred. However, the effect of gender was contradictory to this straightforward interpretation. Gender was the only consistently significant ego-level variable that predicted both NA and PLP. We observed while girls reported more network activity, they scored less in their report regarding perceived learning potential. This finding indicates that network activities' usefulness for learning is perceived differently across boys and girls. Earlier studies regarding attitudes towards computer use regularly reported gender differences, with boys having more favorable views than girls (e.g., Ian Robertson, Calder, Fung, Jones, & O'Shea, 1995). The gender gap regarding computer use and attitudes towards new technologies is gradually disappearing (Tsai & Tsai, 2010; Ünlüsoy, Haan, Leseman, & van Kruistum, 2010). However, boys' relatively longer history and comfort in computer use could possibly explain the higher (perceived) learning score compared to girls.

Our results also showed that youth attending the higher educational tracks spent significantly less time with online social networking; however, for perceived learning potential the education level did not have a significant influence. It is possible that the higher the academic demands, the less time youth spend in social networking platforms. It is also plausible that youth within the lower educational tracks need more assistance and seek help from each other on networking platforms to accomplish school-related tasks.

That these activities shape youth‘s learning experiences through their networked relationships has implications for how we conceive of learning in the digital age. Starting from the idea that learning happens at the interplay of internal cognitive processes and external socio-cultural factors, it can be claimed that these external factors are being shaped in different ways. Whereas the standard model of social interaction was formerly focused on one-to-one communication, internet based activity is more based on networked structures that involve particular configurations (scales, densities, internal diversities, and geographical spreads) of participants who distribute and enact human learning opportunities. Moreover, these networked structures distribute and enact connections with non-human resources -tools, information, and representations of all kinds- also structured in relation to the human configurations. Learning processes are necessarily informed by, and change through, these different structures. If the learning for socially-apprenticed individuals is thought of as the “transformation of persons” (Lave & Wenger, 1991), then learning in socially and materially distributed structures could be re-conceived as the “transformation of networks”.

The study had several important limitations. First of all, based on our data we can neither claim that learning actually took place, nor provide information on the quality or content of the learning processes that happen within these networks. The cross-sectional design of the study offers a snapshot of ego-networks. However, a longitudinal design will provide more insights in how network activities and people’s perception of learning in SNPs and the online ego-network constellations develop over time. Our findings are based on youths’ ‘top-five’ online contacts. It could be argued that due to our name generating criteria of the five most contacted people, we captured mainly locally-based, densely-knit, homogeneous networks, but missed a more varied ‘network picture’. Nevertheless, our findings showed ethnic diversity in network compositions and revealed how network activity patterns and youths’ perspectives on their online learning experiences varied regarding a number of socio-demographic attributes and network factors.

To conclude, in this article we researched the claim that the popular online networking platforms have a broad potential for learning and socialization. It is assumed that in order to tap into this potential effectively, a person needs to have an active ego-network with whom s/he can regularly exchange information, give and receive feedback. However, it is also crucial that this potential is acknowledged by educators and parents. This recognition is needed to establish more holistic learning experiences for youth in which the divide between school learning and learning that happens throughout life is reduced. There is an increased emphasis on studying meaningful learning experiences throughout the life time, accounting for multiple spaces and places as 'learning sites' and for "bridging the binary opposition between formal and informal learning" (Erstad, et al., 2009, p.100). We suggest that one way forward in this line of research is to include online networking platforms as a learning context. The ambition of this paper was to make a start with unraveling the complex relations between network structure, individual characteristics and the learning potential inherent to network interactions. We hope that the findings of our study can contribute to the recognition of the potential and importance of learning this highly networked world.

References

Alexander, M.L. (2009). Qualitative social network research for relational sociology. Proceedings of *the Australian Sociological Association Conference 2009: The Future of Sociology*. Retrieved Oktober, 29 2011 from http://www.tasaconference2009.com/

Borgatti, M.S. (1998). *Ego-networks.* Retrieved September 5, 2012, from http://www.analytictech.com/networks/egonet.htm

boyd, danah. "Understanding Socio-Technical Phenomena in a Web2.0 Era." Talk given to Microsoft Research New England. Cambridge, MA. 22 September 2008. Retrieved from http://www.danah.org/papers/talks/MSR-NE-2008.html

Cohen, N. (2009, June 22). As Blogs Are Censored, It's Kittens to the Rescue. *The New York Times*. Retrieved on May 29, 2013 from http://www.nytimes.com/2009/06/22/technology/internet/22link.html

Cole, M. (1996). *Culture in Mind*. Harvard University Press, Cambridge, MA.

Cole, M. & Wertsch, J.V. (2004). Beyond the Individual-Social Antimony in Discussions of Piaget and Vygotsky. Retrieved on February 12, 2013 from http://www.massey.ac.nz/~alock/virtual/colevyg.htm

Diepstraten, I., du Bois-Reymond, M., & Vinken, H. (2006). Trendsetting learning biographies: Concepts of navigating through late-modern life and learning. *Journal of Youth Studies, 9*(2), 175-193.

Erstad, O. (2005). Expanding possibilities: project work using ICT. *Human Technology, 1*(2), 109–264.

Erstad, O., Gilje, Ø., Sefton-Green, J., & Vasbø, K. (2009). Exploring 'learning lives': community, identity, literacy and meaning. *Literacy, 43*(2), 100-106.

Erstad, O. (2012). The learning lives of digital youth -beyond the formal and informal. *Oxford Review of Education, 38*(1), 25-43.

Garton, L., Haythornthwaite, C. & Wellman, B. (1997). Studying online social networks. *Journal of Computer-Mediated Communication, 3*(1). Retrieved September 19, 2000 from: http://www. ascusc.org/jcmc/vol3/issue1/garton.htm.

Gee, J.P. (2004). *Situated Language and Learning: A Critique of Traditional Schooling*. New York: Routledge.

Haythornthwaite, C. (2006). Learning and knowledge networks in interdisciplinary collaborations. *Journal of the American Society for Information Science and Technology, 57*(8), 1079-1092.

Hodgson, V., McConnell, D., & Dirckinck-Holmfeld, L. (2012). The Theory, Practice and Pedagogy of Networked Learning. In Dirckinck-Holmfeld, L., Hodgson, V. and D. McConnell (Eds.) *Exploring the Theory, Pedagogy and Practice of Networked Learning* (pp. 291-305). Springer New York.

Hox, J. (2010). *Multilevel analysis: Techniques and applications*. Routledge Academic.

Ian Robertson, S., Calder, J., Fung, P., Jones, A., & O'Shea, T. (1995). Computer attitudes in an English secondary school. *Computers & Education,24*(2), 73-81.

Ito, M., Baumer, S., Bittanti, M., boyd, d., Cody, R., Herr-Stephenson, B., et al. (2010). *Hanging out, messing around, 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., Schor,J., Sefton-Green, J., & Watkins, S.C. (2013). Connected learning: An agenda for research and design. Retrieved from http://dmlhub.net/publications/connected-learningagenda-research-and-design

Jenkins, H., Clinton, K., Purushotma, R., Robison, A. J., & Weigel, M. (2006). Confronting the challenges of participatory culture: Media education for the 21st century. MacArthur Foundation.

Jones, C., & Steeples, C. (2002). Perspectives and issues in networked learning. In Steeples, C. & Jones C. (Eds.) *Networked learning: perspectives and issues* (pp. 1-14). Springer London.

Kumpulainen, K., Mikkola, A., & Jaatinen, A.M. (2013). The chronotopes of technology-mediated creative learning practices in an elementary school community. *Learning, Media and Technology*, (ahead-of-print), 1-22.

Larsen, M.C. (2007, October). Understanding social networking: On young people's construction and co-construction of identity online. *Presented at The Society for Social Studies of Science (4S) Annual Conference Montreal, Canada.*

Lankshear, C.,& Knobel, M. (2006). *New literacies: Changing knowledge in the classroom.* Open University Press.

Lave, J.,& Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press, MA.

Leander, K., & de Haan, M. (2011). Net-working expansive forms of identity and learning: Examining the new media practices of immigrant youth in the Netherlands. *The American Educational Research Association, 2011 Annual Meeting,* New Orleans, Louisiana.

Madden, M., Lenhart, A., Duggan, M., Gasser, U.,& Cortesi, S. (2013). Teens & technology 2013**.** Retrieved from http://www.pewinternet.org/Reports/2013/Teens-and-Tech.aspx

McLoughlin, C., & Lee, M.J. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. *Proceedings ascilite Singapore 2007* (pp. 664-675). Retrieved from http://www.ascilite.org.au/conferences/singapore07/procs/mcloughlin.pdf

McPherson, M., Smith-Lovin, L., & Cook, J.M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology, 27*, 415-444.

Morgan, S.L., & Soerensen, A.B. (1999). Parental networks, social closure, and mathematics learning: A test of Coleman's social capital explanation of school effects. *American Sociological Review, 64,* 661-681.

Rainie, H., Rainie, L.,& Wellman, B. (2012). *Networked: The new social operating system*. MIT Press.

Rasbash, J., Charlton, C., Browne, W.J., Healy, M.,& Cameron, B. (2005). *MLwiN version 2.02*. Centre for Multilevel Modeling, University of Bristol

Röper, A., Völker, B.G.M. & Flap, H.D. (2009). Social contacts and getting a home. Do networks matter? *Social Networks, 31,* 40-51.

Ryabov, I. (2009). The role of peer social capital in educational assimilation of immigrant youths. *Sociological Inquiry, 79*(4), 453-480.

Singla, P., & Richardson, M. (2008, April). Yes, there is a correlation:-from social networks to personal behavior on the web. *Proceedings of the 17th International Conference on World Wide Web* (pp. 655-664).

Stauber, B. & Walther, A. (2006). De-standardised pathways to adulthood in Europe: informal learning in informal networks. *Papers, Revista de Sociología, 79,* 241-262.

Thelwall, M. (2008). Social networks, gender, and friending: An analysis of MySpace member profiles. *Journal of the American Society for Information Science and Technology, 59*(8), 1321-1330.

Ünlüsoy, A., Haan, M.de, Leseman, P.M., & vanKruistum, C. (2010). Gender differences in adolescents' out-of-school literacy practices: A multifaceted approach. *Computers & Education, 55*(2), 742-751.

van Duijn, M.A.J., van Busschbach, J.T., & Snijders, T.A.B. (1999). Multilevel analysis of personal networks as dependent variables. *Social Networks, 21,* 187-209.

Vygotsky, L.S. (1978). *Mind in society*: *The Development of Higher Psychological Processes.* Harvard University Press, USA.

Williams, R.A. (2011). *Multicollinearity* [pdf document]. Retrieved on 5 May 2012 from http://www.nd.edu/~rwilliam/stats2/l11.pdf

Wertsch, J.(1998). Mind as action. NY: Oxford University Press.

Highlights

- The study of network structures is relevant to investigate learning.
- Networked learning is a likely result of frequent, diverse network activities.
- Densely-knit, homogeneous ego-networks endorse learning activities.
- Diverse ego-network configurations shape learning experiences differently.

Table 1

Descriptive Information of the Participants and their Online Network Relationships

Participants' (Ego) Characteristics (n=1227)		
Gender	Girls	56.1%
	Boys	43.9%
Ethnicity & Generation	Dutch	33%
	From Turkish Background	12.6%
	1st Generation 13.7%	
	2nd Generation 86.3%	
	From Moroccan Background	24.4%
	1st Generation 18.7%	
	2nd Generation 81.3%	
	Other Ethnicities	30%
	1st Generation 37.4%	
	2nd Generation 62.6%	
Education	Vocational	54%
	Higher Preparatory	17%
	Higher General Continued	17%
	Pre-University Secondary	12%
Network Contacts (Alters) Characteristics (n=6135)		
Gender	Girls	55.8%
	Boys	44.2%
Ethnicity	Dutch	44.7%
	Turkish	12.5%
	Moroccan	14.1%
	Other	28.7%
Age	Younger than 12	2.1%
	Between 12-18	88.2%
	Older than 18	9.7%

Table 2
Ego-Networks' Composition Compared by Ethnic Groups

		Dutch Ego-Networks (n=2025)	*Turkish Ego-Networks (n=765)*	*Moroccan Ego-Networks (n=1500)*	*Other Ego- Networks (n=1845)*	
		% within Ethnicity (ASR)	% within Ethnicity (ASR)	% within Ethnicity (ASR)	% within Ethnicity (ASR)	*Pearson Chi Square* (*df*)
Gender & Ethnic Homogeneity	*No Same-Gender*	2.5%(3.6)$_{a}$	0.7%(-2.3)$_{b}$	1.3%(-1)$_{a, b}$	1.4%(-1.1)$_{a, b}$	$\div^2$ = 15.135 (3) $p < .01$
	Average Same Gender	69.4%(7.7)$_{a}$	52.3%(-6.3)$_{b}$	53%(-8.8)$_{b}$	67.2%(4.9)$_{a}$	
	All Alters Same Gender	28.1%(-8.8)$_{a}$	47.1%(7)$_{b}$	45.7%(9.2)$_{b}$	31.4%(-4.7)$_{a}$	
	No Same-Ethnicity	2.2%(-14.5)$_{a}$	3.3%(-6.8)$_{a}$	18%(11.5)$_{b}$	15.4%(8.9)$_{b}$	$\div^2$ = 960.292 (6) $p < .001$
	Average Same-Ethnicity	47.7%(-14.9)$_{a}$	62.1%(.7)$_{b}$	70.7%(8.9)$_{c}$	66.9%(6.4)$_{c}$	
	All Alters Same-Ethnicity	50.1%(25.7)$_{a}$	34.6%(3.7)$_{b}$	11.3%(17.3)$_{c}$	17.6%(-12.8)$_{d}$	
Geographical Dispersion	*The same house*	4.7% (-1.6)	6.3% (1.2)	6.1% (1.4)	5.1% (-.5)	$\div^2$ = 256.522 (12) $p < .05$
	The same neighborhood	34% (-4.8)$_{a}$	41.7% (2)$_{b}$	45.8% (6.7)$_{b}$	35.7% (-2.8)$_{a}$	
	The same city	31.9% (-2)	36.3% (1.7)	32.7% (-.9)	35.1%(1.6)	
	Elsewhere in the Netherlands	26.7% (13)$_{a}$	8.2% (-7.2)$_{b}$	10.8% (-7.7)$_{b}$	16.9%(-.8)$_{c}$	
	Outside the Netherlands	2.7%(-5.8)$_{a}$	7.5% (3.2)$_{b}$	4.6% (.9)$_{c}$	7.1%(4.5)$_{b}$	
Relations	*Family*	10% (-8.3)$_{a}$	19.9%(-3.4)$_{c}$	20.7%(-6.2)$_{c}$	15.8% (.2)$_{b}$	$\div^2$ = 86.312 (6) $p < .001$
	Friends	83.5% (6.4)$_{a}$	74.8%(-2.7)$_{c}$	74.2% (-4.8)$_{c}$	78.6% (-.1)$_{b}$	
	Acquaintances	6.5% (1.7)	5.2% (-.6)	5.1% (-1.2)	5.7% (-.2)	

Notes: *Adjusted Standardized Residuals (ASR) indicates how far the observed count is from the expected count. Ethnicity categories with different subscripts ($_{a, b, c, d}$) refer to column proportions that differ significantly at the .05 level.

Table 3
Predicting the Network Activities in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	*β*	*B (S.E.)*	*β*	*B (S.E.)*	*β*
	Fixed Effects						
	Intercept	2.480 (.052)		2.491 (.065)		2.447 (.053)	
Network Level Variables	Gender[1]	.205 (.031)	.07***	.183 (.032)	.06***	.180 (.034)	.06***
	Age	-.006 (.002)	.02***	-.006 (.002)	.02***	-.005 (.002)	.02***
	Ethnicity[2]						
	Turkish	.036 (.053)		-		-	
	Moroccan	-.002 (.05)		-		-	
	Other	.003 (.068)		-		-	
	Geographic Dispersion	-.006 (.016)		-		-	
	Type of Relationship[3]						
	Friend	.000 (.04)		-		-	
	Acquaintance	.003 (.068)		-		-	
	Offline Meetings	.020 (.011)	.02*	.021 (.010)	.02*	.021 (.010)	.02*
	Online Meetings	.161 (.013)	14***	.158 (.013)	14***	.157 (.013)	14***
	Emotional Closeness	.060 (.014)	.06***	.061 (.013)	.06***	.062 (.013)	.06***

Table 3 (continued)
Predicting the Network Activities in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	*β*	*B (S.E.)*	*β*	*B (S.E.)*	*β*
	Socially-Driven Topics	.117 (.012)	.13***	.109 (.014)	.13***	.111 (.014)	.13***
	Interest-Driven Topics	.037 (.010)	.10***	.041 (.010)	.10***	.038 (.011)	.10***
	Density	.176 (.098)	.04*	.175 (.098)	.04*	.165 (.09)	.03*
Ego-Level Variables	Gender[1]			.182 (0.62)	.07*	.178 (0.63)	.06***
	Age			-.015 (.02)		-	
	Ethnicity						
	Dutch-Turkish			-.160 (.100)		-	
	Dutch-Moroccan			-.089 (.079)		-	
	Dutch-Other			.008 (.076)		-	
	Turkish- Moroccan			.101 (.103)		-	
	Turkish-Other			.164 (.100)		-	
	Moroccan-Other			.063 (.081)		-	
	Generation[4]			.045 (.026)		-	
	School Level[5]						
	Higher Preparatory			-.020 (.082)		-.024 (.082)	
	Higher General Continued			-.148 (.086)	.04*	-.173 (.083)	.04*
	Pre-University Secondary			-.272 (.097)	.06*	-.251 (.096)	.06*

Table 3 (continued)
Predicting the Network Activities in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	*β*	*B (S.E.)*	*β*	*B (S.E.)*	*β*
Interactions	Density*Geographic Dispersion	-.103 (.056)	.02*	-.078 (.051)			
	Density * Offline Meetings	-.036 (.04)		-		-	
	Density * Online Meetings	.006 (.046)		-		-	
	Density*Emotional Closeness	.016 (.046)		-		-	
	Density*Interest-Driven Topics	.077 (036)	.03**	.081 (.031)	.03**	.088 (.031)	.03**
	Density*Social-Driven Topics	.021 (.046)		-		-	
Random Slope							
	Alter Gender					.202 (.049)	
	Intercept*Alter Gender Covariance					-.092 (.039)	
	Emotional Closeness					.093 (.012)	
Random Effects							
	Ego-Level Variance	.907 (.043)		.883(.043)		.863 (.056)	
	Network-Level Variance	.715 (.015)		.715 (.015)		.612 (.015)	
	Deviance	16797.388		16778.213		16621.590	

Notes Reference categories [1] 'boys' both for network- and for ego-level measurement, [2] 'Dutch', [3] 'Family relationships' [4] '1st generation' [5] 'Vocational Education'. * $p<.05$; ** $p<.01$; *** $p<.001$

Table 4
Predicting the Perceived Learning Potential in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	***â***	***B (S.E.)***	***â***	***B (S.E.)***	***â***
Network Level Variables	*Fixed Effects*						
	Intercept	2.(.062)		2.585 (.055)		2.596 (0.51)	
	Alter Gender[1]	.123 (.037)	.04***	-.021 (.025)		-.090 (.036)	.03***
	Alter Age	-.005 (.003)		-		-	
	Alter Ethnicity[2]						
	Turkish	.049 (.064)		-		-	
	Moroccan	.058 (.061)		-		-	
	Other	.050 (.044)		-		-	
	Geographic Dispersion	.018 (.020)		-		-	
	Type of Relationship[3]						
	Friend	-.037 (.049)		-		-	
	Acquaintance	.000 (.083)		-		-	
	Offline Meetings	.042 (.014)	.04***	.020 (.010)	.04*	.011 (.08)	
	Online Meetings	.168 (.016)	.13***	.005 (.010)		-	
	Emotional Closeness	.031 (.016)	.03*	-.020 (.010)	.02*	-.018 (.010)	
	Socially-Driven Topics	.089 (.016)	.09***	-.018 (.010)	.02*	-.015 (.010)	

Table 4 (continued)
Predicting the Perceived Learning Potential in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	***â***	***B (S.E.)***	***â***	***B (S.E.)***	***â***
	Interest-Driven Topics	.071 (.013)	.08***	.029 (.08)	.04**	.027 (.08)	
	Density	.112 (.112)		-		-	
Ego-Level Variables	Ego Gender[1]			-.130 (.036)		-.092 (.036)	.03***
	Ego Age			.004 (.006)		-	
	Generation[4]			.006 (.089)		-	
	Ego Ethnicity						
	Dutch-Turkish			-.014 (.055)		-.004 (.054)	
	Dutch-Moroccan			-.096 (.044)	.08**	-.093 (.044)	07**
	Dutch-Other			.058 (.042)		.058 (.042)	
	Turkish-Moroccan			-.081 (.057)		-.089 (.056)	
	Turkish-Other			.044 (.055)		.055 (.055)	
	Moroccan-Other			-.037 (.045)		-.034 (.044)	
	School Level[5]						
	Higher Preparatory			-.038 (.045)		-	
	Higher General Continued			.012 (.047)		-	
	Pre-University Secondary			.033 (.053)		-	

Table 4 (continued)
Predicting the Perceived Learning Potential in SNPs

		Model 1		Model 2		Model 3	
		B (S.E.)	***â***	***B (S.E.)***	***â***	***B (S.E.)***	***â***
Interactions	Keeping in touch			.044 (.011)	.05***	.044 (.011)	.05***
	Sharing/Exchanging			.319 (.012)	.32***	.319 (.012)	.32***
	Editing/Creating			.128 (.013)	.13***	.126 (.013)	.13***
	Asking advice			.217 (.011)	.22***	.217 (.011)	.22***
	Giving feedback			.235 (.012)	.24***	.236 (.012)	.24***
	Ego*Alter Gender					.132 (.050)	.04***
	Random Effects						
	Ego-Level Variance	1.132 (.056)		.218 (.013)		.217 (0.13)	
	Network-Level Variance	1.081 (.023)		.481 (.010)		.481 (.010)	
	Deviance	18991.875		13672.321		13663.300	

Notes Reference categories [1] 'boys' both for network- and for ego-level measurement, [2] 'Dutch', [3] 'Family relationships' [4] '1st generation' [5] 'Vocational Education'. * $p<.05$; ** $p<.01$; *** $p<.001$