Learning through network interaction: the potential of ego-networks

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Abstract

This study deals with online personal social networks (i.e., ego-networks) of youth 12-18 years old, in the Netherlands and investigates if and how these networks operate with respect to learning. The online ego-networks of youth, and the potential these networks have for learning, are largely unexplored. What kinds of resources do youth have access to through their networks? With whom do they connect? How can we characterize these relations in terms of the frequency they meet online and offline, emotional closeness, topics of conversation, and geographical dispersion of contacts? What kinds of networks provide learning experiences? How can we predict these networks? This study describes in detail the characteristics of these ego-networks. Furthermore, we tested the claim that learning in online networks is a likely result of frequent network activity. Particularly we questioned if popular social network activities such as sharing links, giving feedback and editing or creating artefacts together online would be related to the discovery of new information. With a multi-level analysis model we were able to differentiate the individual influences and the influence of their ego-networks on the frequency of discovering new information and overall network activity. The results showed that these network activities strongly and positively predicted discovery of new information. With respect to the people with whom youth construct their networked communities, the study show that youth connects online primarily with contacts who are similar, who live close by and who are emotionally close. In contrast to claims in the literature in which innovation and learning is associated with heterogeneous contacts, these results show that youth chooses homogeneous, emotionally close and locally based online relationships to explore their interests, to relate to and to discover new information together. A possible explanation may be that in this age group, youth are still fostering the ties to their immediate community and that being accepted and being similar may allow for a safer exploring of the world. These results suggests that rather than stating how a particular kind of tie or network predicts innovation, or is likely to provide new information, these relations need to be contextualised and understood from their local, specific settings and social dynamics.

Keywords

Social networks, ego-network analysis, youth cultures, informal learning practices

Introduction

In a networked learning approach, 'learning' is considered to be "an available outcome of the deployment of networked technologies" (Jones & Steeples, 2002, p.2). That is, learning is a likely but not a predetermined outcome of engagement. In order to grasp the likelihood of learning as an outcome of network activity, Jones and Steeples suggest that comprehensive and systematic observations of networked online practice are needed. Despite this need, the social character of our learning has not been quite this visible before, for it is now possible to trace resources distributed over a network and see a person's connections within a larger social network (Gee, 2008).

What do informal, open-access, and common social networking platforms offer their users in terms of learning potential? Social networking covers activities such as posting messages on network profiles and/or chat sites, participating in newsgroups or online discussions, instant messaging, writing and reading comments on weblogs

ISBN 978-1-86220-283-2

and profiles, editing, uploading and creating artifacts. While some platforms highlight making social connections as a central characteristic (e.g., Facebook, Hyves, LinkedIn, Google+, etc.), others prioritize different uses like video- or photo-sharing (e.g., YouTube, Flickr), browsing the Internet (e.g., Stumble Upon), discussion forums (e.g., Everquest) or online radios (e.g., Last.fm). However, whether they prioritize social connectedness or not, most platforms require membership, reveal some personal information and, based on mutual agreements between sites, they may converge with each other (e.g., to log in YouTube with Google account). Private, public and/or instant messaging is possible; communication can be synchronous and/or asynchronous. There are connections between people as well as within someone's account. The more time spent on social networking, interests in certain subjects, artifacts or people are revealed. In return more precise and personalized suggestions are received from the network. Moreover, participants receive news, updates, comments, invitations and messages from their contacts. In sum, in these social networks people reach out to others, build communities, share ideas and artifacts, and create and edit the content within the networks.

It seems inevitable that participating in networked communities leads to coming across new information and to forming new connections. They seem to provide seemingly endless opportunities for exploring and navigation (Cousin 2005). Besides having the potential to accumulate information and expertise, network knowledge is collectively created and open-access. The network structure itself clearly demonstrates that information comes from different resources and also is distributed among individuals who can access this knowledge. Levy (2000) summarizes the process of accessing knowledge in networks as "everyone knows something, nobody knows everything, and what any one person knows can be tapped by the group as a whole" (cited in Jenkins et al., 2006, p.39).

In Cultural Historical Activity Theory (CHAT, Vygotsky 1978; Engeström 1987, 1993), a social learning theory developed prior to the examination of networks, the distributed and interactional characteristics of learning are extensively explored and explained. In this perspective it is argued that the human mind and actions are mediated through cultural, material and psychological tools, so called "tools of the mind" (Vygotsky, 1978). According to Vygotsky, high-level cognitive functions first appear inter-psychologically, as a result of interaction with others and artifacts. The intra-psychological mechanisms develop as a consequence of this interaction; what is external becomes later accessible to us in our mind (Wertsch 1998). Thus, for our cognitive development and learning our interactions with others (people or artifacts) are crucially important.

Linking the CHAT perspective to current digital practices, it can be claimed that digital tools, like any other cultural tools, mediate our self-representation, communication, understanding of the world and our learning (Wertsch 2002; Gee 2004). Our encounters with networked technologies (phones, laptops, online sites) as well as our participation in the networked communities just described enable new ways of accessing and processing information. These developments ask for a rethinking of how we should understand 'mediated activity' and how new forms of mediation shape individual and social development. Furthermore, as stated by Leander and de Haan (2011), in these 'rapidly expanding social media practices, activity is distributed in increasingly dispersed ways; it is often engaged in by loose and shifting communities of people; it has fuzzy and flexible system boundaries, and is mediated by tools and signs that are highly mobile and hybridized'. This provides new challenges to theorize human mediated activity from a CHAT perspective. Taking a network perspective might help to solve part of these complexities.

Different kinds of ties and their potential for learning

Youth are claimed to be readily motivated and eager participants of social networking (boyd, 2007; Rooij, Schoenmakers, Meerkerk, & Mheen, 2009). In their ethnographic research, Ito and colleagues' (2010) classify varying types of motivation: friendship-driven and interest-driven. In the former, existing friendships are carried to the online platform while in the latter; the particular interest (e.g., politics, agriculture, gaming, etc.) precedes friendships and exceeds local, social and cultural boundaries. These two motives serve different purposes, but these are not mutually exclusive forms of networking. Besides individual motivations, important factors that define network characteristics are the types of relational ties (Haythornthwaite & de Laat, 2010). Ties can, for instance, vary in emotional closeness, frequency of contact, kind of activities and meaning of the relationship. A well-known distinction that is made in the literature is between strong and weak ties. Strong relations are marked by emotional bonding, a shared history, and multiple common others, e.g., family; whereas ties with casual acquaintances or friends of friends are called weak (Granovetter, 1973). Despite a certain lack of commonality (or maybe because of it) we are tied to our weak relations, just as we are tied to our strong ones. From a social capital perspective, weak ties are our 'bridging' connections, people who provide access to

ISBN 978-1-86220-283-2

different communities, and strong ties are our 'bonding' connections, people with whom we share the same community(ies) (Granovetter, 1973; Putnam, 2000). If we think of these ties as learning resources in networks, the kinds of information these ties will bring is likely to be different. The weak ties potentially bring up information that will extend our knowledge and through adopting new perspectives might lead to innovation. Strong ties, in contrast, would provide us information from our close community, confirm what we already know, but also might provide us with the sustained interaction, mutual engagement, coordination and convergence (shared values and shared focus), which could be associated with the idea of a community of practice as described by Wenger (1998). From studies of youth networks, evidence can be found that the exchange of information and networked support for learning can come from both kinds of ties. For instance, Ito and colleagues (2010) indicate that specific interest groups, or learning communities grouped around one particular theme and formed to improve their skills and knowledge on a particular theme, generally consist of weak ties. However, there is also evidence that close social network ties foster community members' intentions to share knowledge (Chen, Chen & Kinshuk, 2009). Besides, there is a vast amount of literature that discusses how homogeneity, geographical dispersion, and density of network contacts impacts the probability of fostering the innovative quality of networked communities, which does point to the complex relationship between network characteristics and their learning potential (e.g. Coe & Bunell, 2003).

In this paper, while we are interested in how certain network characteristics, such as network density, geographical dispersion and homogeneity of network members relate to the possibilities to form learning or knowledge communities, it is not our intention to generate findings about this relationship or to generate 'fixed' network typologies. Even if we are inspired by some of the literature on how the internet transforms communities and social networks (e.g., Wellman, 2003) or what community characteristics it takes to build a knowledge community (Henry & Pinch, 2000), we assume that the social networks we study are particular networked constellations of particular groups that foster unique possibilities for learning. Following Coe & Bunell (2003), we suggest that one should make no general a priori presumptions as to how configurations of network relations in terms of, for instance, their spatial organization, density and heterogeneity foster innovation, generates knowledge, or produces an active learning community.

Current study: the Dutch context, concepts, and research questions

Young people around the world are more immersed in digital, mobile technologies than in any previous generation. However, youth in the Netherlands constitute a special case regarding social network use. They are the leading social network users in the European Union, with 91% of youths actively using their social network accounts in 2010 (CBS, 2011). While we know about social media trends, including time spend on various platforms (e.g., Facebook, emailing, etc.), we are yet to learn about the kinds of relational ties youth have, the structural aspects of their networks such as homogeneity and density, their driving forces to participate in social networks, the intensity of their interactions, and if, according to these youth, these networks provide them with new resources or the discovery of knowledge.

This study is a part of a larger research project, Wired Up (www.uu.nl/wiredup) that researches identity formation and learning in the modern digital world, both for Dutch youth and youth from different ethnic minorities living in the Netherlands. It is a multi-method research project in which survey, several interview formats and ethnographic approaches are combined. Here, only the network part of the survey study is presented in which ego-networks are captured. Ego-networks provide valuable information about individual perspectives on significant human relationships. They provide details about relational resources (e.g., strong ties versus weak ties), kinds of exchange (e.g., conversation topics) and frequency of networked interactions. They also provide information about the social structure of the network and how these structural characteristics are specific to certain subpopulations (Wellman & Berkowitz, 1988).

As argued previously, learning in networks is a likely, but not necessary result of networked activity. We assume that what potentially influences learning are the intention and characteristics of the person who builds his or her network, characteristics of the contacts in the network (e.g., kind of ties), characteristics of the interaction between the person and his/her contacts, structural aspects of the network (e.g., density) as well as the intensity of activity within the network. Another factor that impacts the odds of learning in a network is awareness; most of the time when we are doing something enjoyable or our daily routine activities we do not realize that we learn (Gee, 2008). A problem in operationalizing this aspect is that 'learning' is for young people often strongly associated with formal institutions. This makes it difficult to measure learning awareness via surveys. Based on piloting work, a conscious decision was made to exclude the word 'learning' when we asked

ISBN 978-1-86220-283-2

youth to reflect on if they perceived a particular relationship as a learning relation. Instead we asked them for how often they 'discovered new information and new things (artifacts, gadgets, platforms)' with each network contact.

From these premises, the research questions we aim to answer in this paper are the following:

a) How can the online networks of these youth be described? This is a bulleted list: (List Bulleted)
- What are the characteristics of the online contacts of youth in terms of gender, age, ethnicity and geographical dispersion?
- What characterizes their online relations in terms of frequency of meeting each other online and offline, perceived emotional closeness, and topics they talk about?
- What characterizes network as a whole (e.g. density of the relations and homogeneity between the alter and ego with respect to gender, ethnicity and age)?

b) Can certain characteristics of these networks predict overall network activity and the discovery of new information?
- Does overall network activity predict discovery? Are there any other characteristics of networks and of individuals within networks that can predict more frequent discovery?
- Which characteristics of networks and individuals would predict more frequent network activity?

Method

Sample

The survey was carried out in the course of 2010 among 1408 students (aged 12-18) in 7 secondary schools in the Netherlands. The results below come from 1227 respondents (87%) of the total survey population. We have excluded 181 cases in total, because 29 cases (2%) reported no network activity and 152 (11%) did not finish answering the survey or failed to provide reliable and consistent information on their network contacts and activities. Of the 1227 participants over half (56%) were female. The sample age was 12-18 (M=14.4, SD=1.54). The participants were from different levels of secondary schools in the Netherlands and from different ethnic backgrounds (Dutch 33%, from Moroccan background 24.4%, from Turkish background 12.6%, and other ethnicities 30%). The sample was comparable with the national distribution and representative for urban youth population.

Procedure

Participants took the survey in their classrooms or a computer room in their school through a template that was facilitated online. Before the survey sessions, instructors explained the general aims of the survey. During the survey, the instructors remained present to supervise the survey process and answer any questions. Most survey rounds took 30 to 40 minutes.

Instrument

The network section of the questionnaire captured data regarding the 5 most frequently contacted network contacts. We inquired concerning the contact's age, gender, ethnicity, the relation to the participant (i.e., family, friend, and acquaintance), emotional closeness to the participant, location, frequency of online/offline meetings, and topics of conversations. Topics in the networks were captured with a dichotomous (yes-no) 17-item list. Also, the frequency of network activities that we assumed potentially relevant to develop learning related communities was assessed: sharing links, photos, videos, and texts, asking for advice, giving feedback, editing/creating digital artifact(s), and checking up on each others online through profile pages. Responses to these were given on a 5-item scale from 1='almost never'- 2='monthly', 3='2or3 times per month', 4= '2 or 3 times per week'- to 5='daily'. To measure any perceived learning potential as a result of network activity, we asked how frequently participants discovered new information and new things (artifacts, gadgets, platforms) with each one of their contacts (henceforth this variable is referred to as 'discovery'). The frequency of 'discovery' was measured with the same frequency scale as above. Finally, we asked 'who knows who' among the 5 contacts and used this information to compute network density.

ISBN 978-1-86220-283-2

Data Analyses

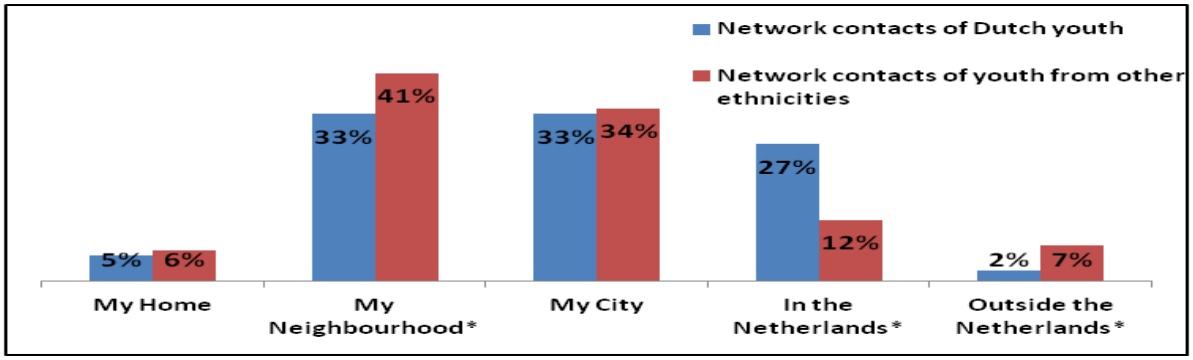
We have used descriptive statistical analyses (e.g., frequencies, averages) in order to describe the characteristics of the ego-networks using SPSS software. Next, we conducted multilevel analyses to identify significant predictors of discovery and network activity using MLwin2.02 software (Rasbash, et al. 2005). The design was such that the network-contacts were nested in each ego-network. Before our analyses we tested the nested structure assumption by comparing a single level model (simple regression model) to the nested model. For clarity and concision we called the lower level 'network-contacts' and the higher level (i.e., our survey takers) 'network-owners'. The model fit with nested data was significantly better, confirming a multilevel structure. We also tested for any third level influence (classroom, school or school level). There was no significant value of 3rd level for our model.

Results

Network Composition of Youth

The five most frequently contacted people over the whole sample totalled 6135 network contacts (1227*5). Of these contacts the vast majority 77% were friends, 15% were family members and 8% were acquaintances. Of the 6135 network connections 56% were female, 45% were Dutch. The networks can be called homogeneous in the sense that there was a large overlap in all demographic characteristics between the participants and their contacts. Regarding gender, 73.7% of the total network contacts were the same gender as the participants. Girls had more gender overlap in their networks than boys. Regarding age, all of our participants were between 12 and 18 and 88% of the network contacts were in the same age group (10% were older and 2% were younger). Regarding ethnicity, 62.4% of the total network contacts were from the same ethnic background as the participants.

The geographical dispersion of the network contacts is presented in Figure 1. The results show that, in terms of the residence of youth's online connections, their networks are primarily local. This is true for both immigrant and Dutch youth, although small differences were also found.



Note. * p<.05 indicates significant difference between groups

Figure 1. Percentages of geographical spread of the network contacts

There was large overlap between online and offline frequency of meetings. A small number of alters (2.4%) were never met in person, but only in the online environment. Most alters were contacted offline and online on a daily basis. Offline and online meetings correlated significantly (r=.450, p<.01). Regarding emotional closeness, the majority of relations (51%) were characterized as (very) personal, 24% of relations were neutral, and remaining 25% were perceived as not personal (at all).

The most commonly talked about subjects were related to one's self and friends (i.e., what happened with you today, what happened in school today and friendships), the least common subjects were scholarly ones (i.e., history and science, arts and literature). For statistical purposes and data reduction, the 17-item subject list was separated in two groups: socially-oriented and interest-driven. The average amount of socially-oriented and interest-driven topics were respectively M=3.6, M=1.5 (SD= 2; SD= 1.6).

ISBN 978-1-86220-283-2

The density of relationships per ego-network was high. Over the total of 6135 network contacts the majority (69.3%) knew each other. The density score per ego-network varied between 0 and 1, 1 indicating everyone was connected. The average density was M=0.64 (SD=0.32), indicating that most ego-networks consisted of dense relations.

Finally, we checked for any relation between overall characteristics of networks (i.e., density, average emotional closeness and geographical dispersion of alters, homogeneity of the network (ego versus alters) in terms of gender, age and ethnicity as well as the extent to which socially-oriented and interest-driven topics were discussed in the network). We found positive and significant correlations between density and emotional closeness ($r=.181$, $p<.01$); between density and both socially-oriented and interest-driven topics (respectively, $r=.191$; $r=.114$ $p<.01$). There were significant and positive correlations between all homogeneity variables (sameness of gender, age and ethnicity). Further, the homogeneity variables had a positive correlation with socially-oriented topics, but no correlation with interest-driven topics which seems to indicate that relationships that are like ego, are more driven by socially driven motives, while relationships that are different from ego are motivated by specific interests. We found significant and positive correlations between emotional closeness and both socially-oriented and interest-driven topics which indicates that young people talk more and about a more varied range of topics with people they feel close to. We found negative correlations between density and geographical dispersion ($r= -.203$, $p<.01$) indicating that network activity decreases with geographical distance.

Multilevel Approaches to Ego-Network Analysis

We used multilevel analyses to answer following questions: Does network activity predict discovery? Are there any other characteristics of networks and of individuals within networks that can predict a more frequent discovery? Which characteristics of networks and individuals would predict more frequent network activity? Multilevel models assume a hierarchical data structure. With this analysis it is possible to separately estimate the variance between lower level (i.e., network-contacts) within higher level structure (i.e., the same ego-network), and the variance between higher level structures. In other words, one can see the influence of both individuals and the social structures that the individuals are from (Hox, 2010). The following steps were taken to analyze the data: First, the 'empty model' was tested. This model without any predictors provides the divide of the total variance between two levels. Secondly, all variables in both levels were added to the models simultaneously and with a list-wise deletion method non-significant predictors were excluded from the model. The model with only significant main effects was considered as the base model. Finally, meaningful cross-level interactions were tested and those that improved the model significantly remained to be included in a final model. The significance of variables were tested with Wald's test and model improvement was tested by the 2*log likelihood goodness of fit statistic.

Predicting Discovery

The total variance of discovery was divided between the 'network-contacts' and 'network-owners' (46% to 54%, respectively). In other words, 54% of discovery was attributed to the differences between 'network-owners' and 46% to the 'network-contacts' characteristics. The most important result here was that each specified network activity item (such as sharing links, making things online) predicted discovery and had an increasing effect on it. Girls reported slightly (but significantly) less frequent discovery than boys. The amount of talk about interest-driven topics also positively predicted 'discovery'. With the final model 87% of the variance in total was explained, with 52% on the network-owner level and 35% on the network-contact level.

Predicting Network Activity

After establishing that network activities had a strong impact on discovery we continued with what would predict overall network activity. The variance of network-activity was divided 59% to 41% for network-owners and network-contacts, respectively. The results showed that girls had significantly more network activity than boys. Regarding the educational level, the highest network activity was observed in the lower trajectory of secondary education (VMBO). All other levels of secondary education scored lower, but only those students in the highest level of schooling had significantly less network activity. Participants from a Turkish background reported less network activity compared to their Dutch peers. Density, indicating the social structure in networks, was a positive, significant predictor of network activity. Not only high density, but also strong ties in terms of emotional closeness was a positive indicator of more frequent network activity. On the network-contact's level, girls' network activity was significantly more frequent and with older alters there was less network activity. Talking about both socially-oriented and interest-driven issues positively predicted network activity as well as the frequency of both online and offline meetings. In the final model 15% on variance in the network-owner level and 4% on the network-contact level were explained. Besides the significant predictors that

ISBN 978-1-86220-283-2

were highlighted in the results of multilevel analyses, it is also noteworthy that in both predictions -for discovery and network activity- geographical disperse of the network contacts did not significantly contribute.

Discussion & Conclusion

The aim of this study was to describe characteristics of youth's ego-networks in detail and to test if these characteristics were related to networked learning. The results confirm earlier studies but also point to some new aspects. We tested the claim that learning in online networks is a likely result of frequent network activity. In particular we tested if popular social network activities like sharing links, giving feed-back and editing/creating artifacts together online would be related to the discovery of new information. We found that these network activities strongly and positively predicted the discovery of new information. However, we cannot know exactly how our subjects interpreted 'discovery of new information' and thus what exactly is learned from the activity according to the respondents. It is assumed, based on a CHAT perspective, that youth's encounters with network technologies (phones, laptops, online sites) as well as their participation in these networked communities enable new ways of accessing and processing information. This study suggests that it is probable that these online networked activities form significant learning communities for young people which they experience as innovative for themselves.

Whether or not youth also expand their life-worlds with online communities still remains to be seen. As argued previously, building bridges beyond one's own community is an important characteristic of learning in the digital age. The widely accepted hypothesis in this regard is that 'diversity in one's network provides access to unique learning resources' (Granovetter, 1973; Haythornthwaite & de Laat, 2010). However, what we have observed in our study was scarcity of diversity in youth networks. In most ego-networks similarity to the network-owner was prominent (i.e., girls befriend girls; ethnic groups befriend people from same ethnic backgrounds). Unsurprisingly, the emotional closeness and the density of the network structures were also high. In conclusion, these data suggest that the online communities that these youth build--both immigrant and native Dutch-- are based on emotionally close ties which are locally based and which are homogeneous with respect to age, ethnicity and gender. According to some literature, these characteristics might not be very stimulating for learning. However, the study shows at the same times that density and emotional closeness predicted network activity, while location did not. This result suggests that even though these online communities are relatively homogeneous and local, their connectedness, the intensity of the activities, and their emotional bonding enables vital and active online communities which youth experience as innovative. Our observation that interest-driven topics increased with emotionally strong ties and decreased with weak ones fits the same pattern. A possible explanation may be that in this age group of 12-18, youth are still fostering the ties to their immediate community and that being accepted and being similar may allow for a safer exploring of the world. This confirms our initial stance that we should simply not talk in a priori and universal typologies when describing how networks and their particular ties relate to a potential to be innovative, gain knowledge or form learning communities, but that these relations always need to be contextualised and understood from their local, specific settings and social dynamics.

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