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ABSTRACT

Many online communities have the problem that they are highly dependent on a small core group of users, as well as are highly inefficient in handling requests for collaboration, resulting in a lower willingness to help and less activity. Both problems have far reaching consequences in the case of learning networks (LN) for online learners. A LN cannot exist without a strong community at its heart. Therefore we propose to introduce short goal-specific communities called Ad Hoc Transient Communities (AHTC) in order to restructure the community in such a way that there will be more ties between learners, less dependence on a core group, and more effective handling of requests through the use of matching. This will result in a decentralized community structure with higher activity, which makes the community stronger.

KEYWORDS

Communities, social networks, e-learning, network centralization

1. INTRODUCTION

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In informal learning, collaboration with other learners is widely accepted and considered very beneficial (Allen 2005; Bell 2005; Chapman, Ramondt et al. 2005; Motteram and Forrester 2005; Cartney and Rouse 2006; Keppell, Au et al. 2006). In order to achieve collaboration several concerns have to be met. First of all the learner needs to be able to ask questions and/or collaborate at any needed time (Van Rosmalen, Sloep et al. 2007). Second, the learner needs to be able to get into contact with those peers that fit best to fulfill the specific needs, Third, the feeling of isolation learners may have needs be lowered. To meet these concerns, experts and peers need to be part of a community (Anderson 2004), which brings them all together.

In a nutshell, a network is needed in which learners who all share an interest in a similar topic, have access to a community, learning materials, and educational possibilities. Allowing them to learn and collaborate in an informal and effective way with peers that fit their requests in the best possible way. These issues are fulfilled as described by Koper en Sloep (Koper, Rusman et al. 2005) in a Learning Network (LN). A LN is a social network designed to support online, non-formal learning. It links learners, learning materials, professionals, institutions, and services, all brought together through the use computer technology. At the heart of each LN are several communities, through which learners and professionals are able to communicate with each other. Without communities a LN can not exist.

Therefore, community formation is a key factor for LNs. We believe that while it is possible to force people together into a community structure (Conrad, 2002), this will never be nearly as effective as a community which emerges from the learners themselves. On top of that, communities have a dynamic rather than a static nature (Smith and Kollock 1999) (e.g. people come and go, relationships change all the time, the information flows go up and down). To deal with these dynamics the community has to be strong, this is to say the community has to be resilient and active. With resilience we mean how well the community is able to bounce back from outside disturbances, that threaten its existence. Resilience typically depends on the amount of ties between learners, the spread of the learners over the network, and how strong the information flow is dependent on a small core group. Activity refers to the amount of information that is shared within the community.

With regard to the resilience, the focus should be on the social structure of the network. For many existing communities it is the case that there is a small core group of expert learners through which most information flows and to whom most ties are connected. This high dependency on a small core group, which is also known as a high *centralization* of the network, heightens the potential of the community easily to become unstable. The reason is that the drop-out of only one or two core-learners can have detrimental effects on the overall community and the information flow within it. Because a LN needs communities with stable structures, the question becomes how the structure of the social network can be made to develop towards stability rather than dependence on a core group.

With respect to the matter of community activity, the focus should be on the 'Inefficiency Problem'. Especially as a community becomes bigger, involves more participants, we hold that certain communication methods become inefficient. For example, if a community network uses a forum as the main method for communication and has thousands of learners, each time a question is asked, it is asked to all forum members at the same time. This is highly inefficient because most of the time the question would only be relevant for a select group of learners and the number of requests can become overwhelming. This will result in a relative small portion of requests being noticed by the relevant people, let alone being fulfilled. This lowers the effectiveness of the community, lowering learners' willingness to help and/or collaborate. Lowering the willingness to help and/or collaborate will result in less actual response, reducing activity in the community (Smith and Kollock 1999).

2. RESEARCH PROPOSAL DESCRIPTION

As described above, we will focus on two problems, namely: 1) How can we improve the social network structure for it to become more resilient to change, and 2) how can we improve efficiency within the community in order to heighten willingness to help and thus increase activity.

Improvements on these points will lead to a stronger community. Social network structure is important because a more spread out, interconnected social network structure will heighten the resilience. For instance, Figure 1 shows two social network structures. The first depicts the situation of high centrality, in which the LN is one large community and dependent on only a small core group. It is clear that if one or more of these core learners would stop, the whole communication and information-flow throughout the whole community network will be disrupted. With the second community network, network centrality is considerably lower. There are more links between learners and there are sub-communities within the LN. Because of the many relationships between people, the drop-out of one or two learners will not influence the structure much.
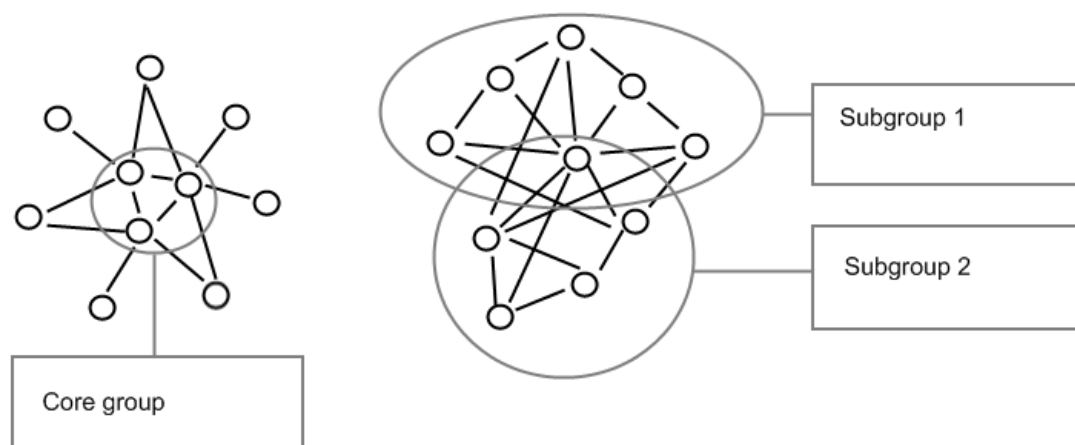

Figure 1 – A high and low network centrality. For explanation, see text above.

Regarding efficiency of the community, we propose to match only appropriate learners requests. This means that, instead of putting each request out to the whole community, only a small number of learners receive the request, based on factors such as content competency, time availability and so on. This is

hypothesized to lead to an increase of acknowledged requests, which in turn will positively influence the willingness to help. A higher willingness to help will increase the amount of accepted requests leading to an overall increase of activity (Smith and Kollock 1999).

A solution to overcome the above mentioned problems is a communication service that uses a peer-selection mechanism to stimulate decentralization of the community network, as well as improve activity through better efficiency. We contend that to accomplish this we need what we call Ad Hoc Transient Communities (Van Rosmalen, Sloep et al. 2007; Van Rosmalen, Sloep et al. 2008; Berlanga, Sloep et al. in press).Through an Ad Hoc Transient Community (AHTC) learners are brought together for a specific goal ('ad hoc') and for only a limited amount of time ('transience'). This is hypothesized to lead to an increase in ties between different learners.

Furthermore, by using peer-matching the AHTC will be very efficient. Van Rosmalen et al. (2008) showed that just randomly matching peers in an AHTC is not as effective as matching peers according to spedific criteria. They also show that the use of AHTCs increased responsiveness, quality of answers, and perceived usefulness of the AHTC. These improvements are closely related to the general willingness to help, which in turn are of great importance for the effectiveness and activity within the community.

To test whether the use of AHTCs will improve effectiveness and decentralize the network, a service has to be constructed that creates AHTCs for each help and collaboration request within the community. The service has to be able to match the right learner(s) to the request, improving effectiveness of the service and network, and consequently heightening community activity. At the same time the transient, short term feature has to ensure that there is an increase in ties between users. This has to lower network centrality and thus improve community resilience. The higher resilience to disturbance as well as the increased activity level makes the community stronger, increasing the likelihood that the community needed for the LN will emerge and continue over time. Table 1 shows an initial description of the AHTC service requirements.

Table 1. AHTC service requirements

What does the service do?	Why is it important?
Provide the possibility to post a request for collaboration or help online.	Learners need to be able to easily make requests online, for fast access and fulfillment.
Determine what knowledge or need the request is aimed at.	This is a prerequisite for the matching. It the group of learners has to be narrowed down according to their level of expertise on the subject.
Select appropriate learners to handle the request.	This will improve the efficiency of the service and heighten the likelihood that the learners invited will be able / willing to help.
The selection procedure has to be based on information about the learners stored in the network.	Many of the criteria are filled in during the time the learner spends in the LN. Activity, level of expertise, and personal interests are all regularly updated in the LN
Selection criteria will be different depending on the type of request.	Depending on the request, different levels of expertise are deemed more beneficial
Invite the learners to fulfill the request.	The service has to actively pursue the learners, increasing the involvement
Create an area where the learners can collaborate together for the duration of the request.	A personal space where the learners for a certain request can work together is of high importance. This will make sure that there is no interference from others and will heighten the efficiency.
Ask for the scoring of tutor competency and helpfulness of the answer after collaboration.	This will help for the matching and will probably determine, whether the results will be opened to the LN
Provide the possibility for learners to store contact information of each other.	This is of high importance for the increase of ties between learners. Learners will have to be able to easily stay in contact with each other after the initial request.

We hypothesize that the AHTC service will:
Increase the number of ties between users.
Make network centralization go down.
Improve the ratio of requests made and requests fulfilled.
Encourage learners' willingness to help.
Increase activity in the group.
Diminish learners' feeling of loneliness and increase community appreciation.

3. METHODOLOGY

To design the proposed AHTC service, we will conduct a literature review that permits to identify the key characteristics that foster interaction. The output of this review will be an initial model that has to be validated by experts or "heavy users". Once the initial model has been validated, then the use case and requirements will be developed.
The second step is to simulate the model. Needless to say, that the simulation should consider the use cases and requirements defined in the previous step. In this second step it has to be decided yet whether it is better to use a simulation (NetLogo) or a proof-of-concept (in the form of a small prototype) or even both.
The third step is to conduct one or two experimental studies for testing the domain model. This could be done applying the domain model to a specific type of ad hoc transient community (e.g. peer-advice). Social Network Analysis (Scott 2000) will then be used to map out and test the social network structure.

4. CONCLUSION

At this stage we are still in the stage of conceptualizing the model. However, it is clear that the aim of this research in not solely for the benefit of Learning Networks. If the mechanism of using AHTCs indeed strengthens the community, this will have a broad applicability for online communities in general.

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