Colloquium

Hyperlink network analysis of the educational blog

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Introduction

With evolving information technology, the Internet has become an essential tool of daily life. Various online tools have emerged including discussion board, websites, blogs, Wikipedia, Facebook and Web 2.0. In the era of Web 2.0, the Internet has become more user-centred and two-way communication is facilitated (Hou, Chang & Sung, in press). The blog is one of the internet tools from Web 2.0. The emergence of such tools accelerates the delivery of knowledge sharing and learning and also changes the forms and patterns of educational communities (Hou et al, in press; Liu & Chang, 2008, 2010). The characteristics of a blog are convenience and ease of use; users and readers are able to communicate via a blog message board. For teachers and administrative staff, blogs can help in collecting and managing information (Chuang, 2008). In Taiwan, many teachers, administrative staff, and students have begun applying blogs to education, for example, in teaching and in classroom management, spreading the new information and sharing their works with others. In the past, there have been few studies using the viewpoints of hyperlink network analysis in examining social network among educational blogs. A hyperlink network also provides a means of communication for fostering information flow (Park, 2003). Educational blogs provide a practical internet platform for interactions and discussions with rapid accumulation and sharing of knowledge. Because of the lack of previous studies on educational blogs and hyperlink network, this study serves as a frontrunner in investigating and analyzing educational blogs through hyperlink network.

Method

Participants

Educational blogs, which include teachers’, administrative staffs’, and students’ blogs of elementary and junior high schools from the Ilan educational blog service provider (http://blog.ilc.edu.tw/blog/summary.php), provided the research samples. This provider was run by the government of Ilan County and was established solely for educational blog communities. A total of 4356 educational blogs matched our research purpose. The researchers chose one excellent blog recommended by the provider (http://blog.ilc.edu.tw/blog/blog/1941) as a starting point. All of the friends’ links in 406 Happy Blog were collected as samples. This same process was repeated until no other new links were generated. Finally, this community became a closed blog hyperlink network with 92 nodes and 402 arcs.
Procedure
A social network consists of the following three elements: (1) ties among actors; (2) actors as mobile nodes; and (3) relationships between actors. Recognition of these elements established the social network analysis model and we used the following procedures to identify a social network.

1. Choosing the starting node or blog A: choose a blog as the starting node or blog A from the blog service provider. An excellent blog recommended by the Blog Service Provider (BSP) was chosen. Blog A must have outbound links in order to form the community network.
2. Obtaining the outbound links: starting from blog A, choose all of the friends’ links on the blog. All of these links were free to be added by other bloggers called the tie of the community of blog A, which can be considered the outbound link of a community member.
3. Cleaning up links: after searching all friends’ links of the node or blog A, the node with no further hyperlink was ended. Yet, all links on this node must be blogs of the BSP platform.
4. Completing the community network: take node or blog A’s outbound links to become new entrances and then connect to their outbound links. Procedures 2–4 were repeated until no new outbound links were found.

Data analysis
Finally, all the collected nodes and links of the teachers’ blogs were reformatted to form the matrix of the directed graph. This graph was then calculated by the social network formula and was analysed by the Pajek programme* for large network analysis. Other related statistical information and data were analysed by SPSS 10.0 (SPSS Inc., an IBM company, IBM Corporation, Route 100 Somers, NY 10589, USA).

Results
Number of ties of social network
The social network of the educational blog community has a total of 92 nodes. Thus, the size of the social network is 92. This social network has 402 arcs; on average, every blog has 4.32 links (SD = 4.49, skewness = 3.47 and kurtosis = 19.99). The statistical results show that the sample community does not have a lot of links; only a few blogs have a sufficient number of links, reflecting the concept of ties in social networks. Concepts of strong and weak ties are important for social network analysis. The strong ties contribute to the completion and creation of linkage; weak ties contribute to establishing outbound links among groups for communicating and providing information; these are, in turn, beneficial to knowledge sharing and delivery.

Figure 1 shows the full features of the social network of the educational blog community. The three bloggers with the most links are nos. 3487, 2288 and 2286. The researchers found that these bloggers all possess plentiful resources, information and responses with a high tie level. The network ties provide members with more opportunities for exchange and reduce both the need to search for information and the costs of doing so. As a result, these three bloggers are relatively active; in other words, the higher the outbound ties of the network (non-repetitive and highly heterogeneous), the more diverse and massive the information that is obtained (Koka & Prescott, 2008). Thus, we can see that the ties of the educational blog community are weak.

Density
The density of a network can be used to assess the tightness of the social structure as well as the ratio of coefficients for the interactions of network members and for possible interactions; the higher the density of the community, the closer the relationship of the community and vice versa. Previous studies show that moderate density tends to be better because a high-density

* Pajek is developed by Vladimir Batagelj and Andrej Mrvar. Some procedures were contributed also by Matjaž Zaveršnik.

community tends to be centralised, and a low-density community tends to be detached (Wasserman & Faust, 1994). The density of this study is 0.05, indicating that it is a detached community, with people not closely connected to each other. This result is related to the number of ties. A dense knowledge network team refers to plentiful links among members with a high degree of social interaction. The weak ties in this study affect the structure of network density.

Distance
According to the theory of six degrees of separation, we can quickly recognise people from different spaces through strong or weak ties. According to the theory of the six degrees of separation, individuals can quickly get to know each other through strong and weak ties. This invisible power flows quickly throughout the social network because the distance between the social network communities determines the speed of diffusing information among members of communities. When the distance is greater, more time is required to deliver messages or information.

Figure 1: Full features of the social network of the educational blog community
Measurement has its diameter. In this study, the diameter is 10 (>6), showing the distance from blogger no. 1162 to blogger no. 2358. This result shows that the hypothesis of the distance of diffusing information for that social network community is greater than the six degrees of separation. It also shows a high level of weak ties. Thus, it took longer to deliver information and it could more easily become distorted. As a result, the structure of social network in the teachers’ blogs in this study is not complete.

Centrality
Centrality can be used to calculate the influence of social community members. Based upon different influences, centrality can be generalised into three primary concepts: degree, closeness and betweenness. The degree of centrality represents how well community members link to others. The more links a member gets, the more superior the status of that member is; closeness of centrality represents the degree of closeness of an individual to others, and betweenness of centrality represents the importance of an individual communicating with others. The more important an individual, the more people need to rely on this person to communicate with others.

In this study, the overall degree of centrality is 0.32. The two bloggers with the highest degree of centrality are no. 2288 (Cd = 0.36) and no. 3487 (Cd = 0.34). The closeness of centrality is determined by calculating the degree of closeness among community members. The higher coefficient value an individual gets, the closer the person is to others and vice versa. In this study, the overall closeness of centrality is 0.59. The two closest bloggers are no. 3487 (Cc = 0.66) and no. 2288 (Cc = 0.51), indicating that these two bloggers are dominant in the educational blog community and are superior in ties, density and distance. However, the network location of the high centrality is beneficial and essential to knowledge flow and knowledge sharing. In addition, the three bloggers with the lowest coefficient values are no. 2665 (Cc = 0.2), no. 2363 (Cc = 0.2) and no. 1162 (Cc = 0.24). This indicates that the coefficient values of these three bloggers in terms of ties, density and distance are all lower than the overall 0.32 of degree of centrality.

Finally, the overall betweenness of centrality in this study is 0.49. The two bloggers with the highest betweenness are no. 3487 (Cb = 0.28) and no. 2288 (Cb = 0.51). The higher betweenness of centrality indicates that information infusion could be monopolised. Fortunately, this situation did not occur in our study. Blogger no. 2288 has higher betweenness of centrality, indicating this blogger is the most important participant for diffusing information within the social network community.

Conclusion
The results of the study on the educational blog community show that it is of low density, indicating that it is an alienated community. Also the ties and density of the educational blog tend to be low, indicating that the centrality of message delivery distance of this blog community is greater than the hypothesis of the six degrees of separation. Additionally, in terms of their centrality, the blogs with higher degrees of ties and density tend to have a higher function in terms of message delivery and control. Thus, it is suggested that the educational blogs under the social network are disadvantaged and marginalised. In the era of a knowledge-based economy, it will take much more time and effort to construct a more complete learning community that makes learning more effective and sharing more diverse.

Acknowledgement
The authors would like to thank the National Science Council of the Republic of China for financially supporting this research under contract nos. NSC99-2631-S-008-004 and NSC 97-2511-S-008-003-MY3.

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