Social Network Theory and Educational Change

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PART 2

Leadership and Social Networks

Strategic "Co-opetition"

Headteacher Networking in Uganda's Secondary Schools

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Global imperatives to improve education guide the reform and change initiatives under way in many nations. This study examines current challenges regarding educational change in the Ugandan context and highlights how networks can provide critical bridges for collaboration that can enhance the reform efforts. The Ugandan education system is implementing changes at all levels to increase accessibility to quality education for every child. A particular focus of the last ten years in Uganda has been the improvement of the secondary school sector.[1] In Ugandan secondary education, the acquisition and deployment of critical resources to support competitive academic performance have been central strategic concerns.

The micro-level problem for Ugandan schools is that they are balancing two interrelated factors, both of which create strategic challenges for resource acquisition. First, in Uganda's increasingly market-driven educational context, schools compete for scarce financial resources based on school performance: better performance attracts more students who pay school fees. Second, achieving competitive levels of school performance requires resources, which must be obtained in a resource-poor environment. Network theory can clarify how an informal secondary school network in the Mukono District of Uganda facilitates resource acquisition to create and sustain competitive academic performance.

BACKGROUND

Informal school networks, composed of ties between headteachers (equivalent to principals in the United States), appear to be facilitating and enhanc-

ing educational change in Uganda. The development and nature of the Ugandan educational settings create and enable the conditions in which these networks have emerged to address critical needs of an expanding number of Ugandan students.

The Ugandan Education System

Formal education was introduced in Uganda during the 1890s by European Christian missionaries. Since that time, a British-style schooling system has emerged that is in a number of ways ahead of many sub-Saharan Africa countries, as evident in global efforts such as the Education for All (EFA) initiatives of Universal Primary Education (UPE) and Universal Secondary Education (USE).[2] For example, Uganda doubled gross enrollment in primary education during the decade of the 1990s, and in 2006 it was the first and remains the only sub-Saharan African country to adopt a policy of free USE.[3]

The commitment of the Ugandan government to UPE in the early 1990s came at a crucial time in Ugandan history. The Idi Amin era (1971–1979) had left the country critically short on resources of all kinds, with too few schools to provide UPE. This context of high demand and low supply of government school facilities quickly gave rise to a system with a high proportion of private schools.

The EFA initiatives are core to the operation of the Ugandan Ministry of Education and Sports (MOES). The organization's commitment to increasing educational quality, equity, and access for all Ugandan children is particularly high. To monitor the quality expectations of EFA, the MOES uses the results of three public examinations: at the end of the seventh year of primary schooling, at the end of the first four years of secondary education, and at the end of the final two years of secondary schooling. While other measures of quality are included in the overall approach of the MOES, the national examination results remain the central measure of school performance.

The MOES moved quickly in the mid to late 1990s to embrace and enable UPE.[4] Financial and human resources were allocated by President Museveni's government to facilitate building schools, training teachers, and enrolling students in the best schooling available. Such efforts significantly increased primary school enrollment, which by the end of the decade approached the UPE access goal of EFA.[5]

Strategic Consequences of UPE

Uganda's success with UPE, however, created a challenge. Doubling gross enrollments in ten years is certainly a significant achievement, but it generated tremendous pressure on the relatively low number of secondary schools in the system. Consequently, the decade of 2000–2009 became focused on consolidating UPE gains while attempting to meet the increasing demands on the overcrowded secondary system.

The market-driven context of secondary school expansion in the 2000s generated a quick period of private school growth. This expansion was followed by market saturation in urban areas creating a surplus of private schools, followed by increased competition among all schools, which led to the demise of a significant number of private schools. The research for this study showed that 26 percent (37) of the private secondary schools in operation in the Mukono District in 2002 were no longer operating in 2008. In the same six-year time period, 181 new schools began operation, 35 percent (64) of which were no longer in operation by 2008. (These schools had either been completely closed or were operating under a different name and different management.) As these statistics show, the 54 percent growth rate of schools in the secondary system of this District (147 to 227) during the 2000s belies an underlying condition of high instability.

The major burden of navigating these volatile conditions falls squarely on the shoulders of secondary school headteachers.[6] The strategic challenges facing headteachers in Uganda changed throughout the 2000s from an initial focus on growth to meet demand to a focus on survival. The consistent pressure for ensuring quality through high performance on national exams shaped the strategic challenges of headteachers, regardless of whether the emphasis was on growth or survival. The demand on headteachers for quality comes from various stakeholder groups: MOES (macro policy need), private school owners (profitability imperative), parents (consumer power), teachers (employment stability), and students (exam performance).[7] While government and private schools are affected differentially, headteachers in both types of schools are impacted significantly by these stakeholder demands.

Resources and Co-opetition
Uganda, like other developing countries, is resource poor. Schools are particularly vulnerable to resource-poor conditions and, consequently, they typically lack necessary resources to produce adequate or desirable levels of performance.[8] The problem of how resource-poor schools in developing countries actually acquire their resources is underresearched, but the strategic answer to meeting demands of performance and stakeholder groups nonetheless rests on those schools acquiring critical resources.[9] Resources can be clustered into four basic groups: financial, physical, human, and information.[10] Effective headteachers use successful strategies to acquire and utilize first the most available and then the most critical of these resources.

Under conditions of low school competition, as in the 1990s and early 2000s when demand for secondary education was high and supply low, social networking between headteachers was a low-cost means for acquiring all types of resources.[11] However, when supply exceeded demand and created competition between schools (as in the late 2000s), a decrease in networking, or at least more limited types of resources shared through net-

work ties, would have been anticipated. But these fluctuating market condi-tions created instead a context of *co-opetition*, in which school headteachers cooperate for some purposes while competing in others.[12] Under co-opeti-tion, headteachers create cooperative network ties with other headteachers for sharing physical, human, and information resources while at the same time competing with them for students and the financial resources that stu-dents provide.[13]

Network Theory

Network theory provides a useful theoretical framework for understanding how headteachers can access resources to support school performance, as it facilitates examining educational networks at multiple levels of analysis.[14] At a micro level, headteachers function as individual network actors represent-ing their schools, and the relationships or dyadic ties between headteach-ers are the conduits for network content flow (e.g., resources). At the macro level, the headteacher relationships between schools create a whole network structure.[15]

Network Actors and Their Relationships

Network ties between headteachers create pathways for the potential flow of a variety of network content to and from schools, such as strategies, informa-tion, and—most important in the Ugandan educational context—the acqui-sition and sharing of resources.[16] The development of network ties to other headteachers can be useful in acquiring resources to improve school perfor-mance, particularly in resource-poor environments.[17] Conversely, absence or inadequacy of headteacher ties can inhibit a school's access to resources and, consequently, its performance. Kitavi and Van Der Westhuizen as well as Herriot et al. promoted networking strategies to help Kenyan headteachers obtain needed resources for their schools.[18] Headteacher relationships both provide "awareness of resources into which one can tap" and the foundation for strong social relationships.[19] Stronger social relationships increase social capital, facilitating access to a wide variety of resources.[20] Three key mech-anisms for creating network ties—homophily, geographical proximity, and resource sharing—increase the potential for resource flows:

> *Homophily.* Homophily indicates that "contact between similar people occurs at a higher rate than among dissimilar people."[21] For example, network ties may develop more easily between headteachers of the same gender or tribal affiliation. Similarly, membership in the Mukono Head-teacher and Parents Association (MHTPA), first organized in 1996, may also help headteachers become aware of each other, build relationships, and understand where available resources are located. Headteachers may also develop ties to schools with similar strategic characteristics, such as size, type of founding body, and academic performance.

Geographical Proximity. Geographical proximity can contribute to the development of network ties. Barney encourages "a geographically embedded view of relations."[22] Additionally, "network theorists are beginning to more regularly incorporate considerations of geographic space in their research questions and analyses."[23] Close geographical proximity supports tie development between headteachers of schools owing to the number of opportunities for interaction and the likelihood of reaching available resources.[24] In the Ugandan context, Hite et al. found that "measures of distance and proximity can and do predict the existence of 'frequent interaction' network ties—that is, participation in a social network."[25]

Resource Acquisition. In Uganda, better performance attracts students. Consequently, higher-performing schools are likely to obtain more student fees and have greater resource stocks. As headteachers search for resources to improve school performance, they are likely to try to "network up" to headteachers of schools with better performance to acquire a variety of excess or shareable asset-specific resources.[26] Headteachers of established, high-performing schools can "mentor" headteachers at emerging schools, reaching out to provide physical and human resources, knowledge, and social capital. Mentoring emerged as a strong cultural norm of cooperation during the 1990s era of high student demand and low competition. Headteachers at mentoring schools, though not needing ties for resource acquisition, often knew aspiring school owners and were willing to share resources with headteachers at these emerging "sister schools."[27] Thus network ties between headteachers can be developed due to the search for resources and/or to the desire to help emerging schools "come up."

The Structure of the Whole Network

The various ties between headteachers create a structural system of conduits and pathways between schools within the network. This network structure can be described in terms of the connectedness and centrality of schools:

Network Connectedness. As headteachers develop more ties within the network, the connectedness within the network increases, creating more pathways for potential resource acquisition. Higher connectedness facilitates stronger ties, greater trust, and more social capital, all of which enable easier access to information and resources and create greater range and extent of available resources within the network.[28] Connectedness also influences cultural cohesion within the network, which can reinforce shared behavioral norms of resource sharing for school performance.[29] The structural embeddedness of headteachers within this connected network system may affect their strategic co-opetition capabilities for improving school performance.[30] For example, because headteachers are in different network positions, they experience differential access to resources, creat-

ing resource sharing asymmetries that enhance or constrain how a school is able to participate in co-opetition.[31]

Network Centrality. Headteachers with more ties are located in the core or center of the network, while headteachers with fewer ties are positioned more peripherally. Headteacher centrality, measured by the number of ties a headteacher has, is a strategic resource for a school, as higher centrality can influence the "flow of assets, information and status, thereby creating resource asymmetries."[32] Central headteachers have greater access to resource flows from the network to their schools and, as a result, can build resource stocks to improve school performance and effectively compete for students.[33] As headteachers create more ties and increase their centrality, they have more influence and visibility within the network, diffuse the school's resource dependencies across more ties, and make the school more attractive for new ties.[34]

Both the MOES and secondary schools have common goals of improved school performance, which can help the MOES accomplish national educational goals and help schools attract students. The problem for secondary schools and their headteachers is how to survive in a market-driven environment and be competitive enough to attract students and the financial resources they bring. Both schools and the MOES will benefit as they better understand the strategic need to develop headteacher networks for resource acquisition. This research focused on the nature of the network of secondary school headteachers in Mukono District, Uganda and its functions in facilitating resource acquisition and school performance.

DATA COLLECTED ON SECONDARY SCHOOLS

The network, geo-spatial, and school performance conditions presented and analyzed in this chapter regarding Mukono District, Uganda, are based on four research projects conducted between 2002 and 2008, as well as on data from the archives of the MOES (table 11-1). The data sampling, collection and analyses are briefly described below.

Network Data: 2002 and 2008

Snowball sampling for the 2002 study began with 10 secondary schools within five kilometers of Mukono Town (the administrative center of Mukono District).[35] Each of the ten initial headteachers named all other headteachers with whom they frequently interacted, resulting in 35 more schools added to the network sample. These new schools indicated an additional 26 schools, for a final sample of 61 network schools. In 2008, the network survey was replicated with headteachers at the 48 schools from the 2002 survey that were still operating. These headteachers identified seventy headteachers with

TABLE 11-1

Research data on secondary schools in Mukono District, Uganda, 2000–2009

Type of data (Year)	Sampling (n)	Instrument	Data Analysis (Package)
Network (2002)	Snowball (n = 61)	Network survey	Network (UCINET) Mapping (NetDraw)
Network (2008)	Replication of 2002 (n = 118[a])	Network survey	Network (UCINET) Mapping (NetDraw)
Geo-spatial (2002)	Mukono Census (n = 143)	GPS location	Mapping (ESRI ArcInfo)
Geo-spatial (2008)	Mukono Census (n = 227)	GPS location	Mapping (ESRI ArcInfo)
School performance (2002 and 2008)	Uganda Census (n = 2,278 schools)	MOES archives	Statistical: Descriptive, correlation, inferential (SPSS)

a. By 2008, thirteen schools (21%) in the 2002 network study had ceased operation leaving forty-eight schools common to both networks.

whom they were frequently interacting. The total 2008 snowball sample included 118 schools. Of these new network schools in 2008, 30 had existed in 2002, and 40 were new schools started after 2002. The network survey, conducted in an interview setting, also collected data for multiple resource sharing relations between these headteachers.

The network data generated five headteacher networks (one frequent interaction and four resource networks). UCINET facilitated analysis of network homophily, connectedness and centrality.[36] Homophily was calculated using UCINET's measures of percentage of homophily (percentage of school's ties similar on a given dimension) and the external-internal (E-I) index (ratio of percentage of ties external and internal to a given dimension). Connectedness was assessed using density—the number of actual ties over the number of potential ties. Centrality was assessed using degree centrality—the number of symmetric ties. NetDraw facilitated the generation of graphical network maps for further display and analyses of size, density, centrality and directionality.[37]

Geo-Spatial Data: 2002 and 2008

Starting with lists provided by the MOES of all secondary schools in the Mukono District, teams of two field researchers geographically located every secondary school in operation in 2002 and 2008, whether or not they were included in the network studies. A total of 147 schools were geo-located in

2002, and 227 were geo-located in 2008. As Tita and Faust indicate that few studies have exact spatial locations for both ego and alters, such geographical data for the network schools provide a rare opportunity for examining the intersection of social and geographical space.[38] The geo-spatial location of each school was collected using handheld global positioning system (GPS) units, in minutes and seconds of latitude and longitude. These data were entered into ESRI's ArcInfo for analysis and mapping.

School Performance: 2002 and 2008

Each year the MOES obtains the annual ordinary level (O-level) national examination data for every student in every school in the country from the Uganda National Examination Board (UNEB). The MOES provided the 2002 and 2008 data for each student and school in the Mukono District. O-level student and school performance data were extracted for the schools involved in the network studies and entered into SPSS for analysis.

School performance was defined categorically as either high, mid, or low.[39] Schools performing one-half standard deviation or more above the mean were labeled as high-performing schools, those between one-half standard deviation above and below the mean were mid-performing schools, and those at or below minus one-half standard deviation were labeled as low-performing schools.

SECONDARY SCHOOL NETWORKS IN MUKONO, UGANDA

In this section, we first address the nature of the network of secondary school headteachers in Mukono, Uganda, including their ties and the larger network structure. The analysis examined five network relations between headteachers: one frequent interaction and four resource-sharing relations.

Frequent Interaction Network

Table 11-2 provides demographic details for the population of schools in the Mukono District and for the headteachers' frequent interaction network. When comparing the schools in the population and in the network between 2002 and 2008, six patterns were evident:

- Growth in the number of network schools (93 percent) outpaced growth in the number of schools in the district (59 percent).
- Network schools reflected the demographics of the larger school population in having a large percentage of private schools.
- Network schools reflected the demographics of the larger school population in having a large percentage of mostly male headteachers.
- Network schools reflected the demographics of the larger school population in having headteachers mostly from the Ganda tribe.

TABLE 11-2

Comparison between all schools and network schools

|	All secondary schools in Mukono District			Mukono secondary schools in network		
	2002	2008	% change[a]	2002	2008	% change
Total number of schools	147	227	59%	61	118	93%
Mean number of students	235	360	51%	336	496	48%
Number of private schools[b]	128	206	61%	49	99	102%
Number of government schools	19	21	11%	12	19	58%
Number of urban schools	49	55	12%	27	38	41%
Number of rural schools	98	172	76%	34	80	135%
Number of schools in MHTPA	45	N/A	N/A	39	77	97%
Female headteachers	24	37	54%	15	22	47%
Male headteachers	123	190	55%	46	96	109%
Ganda headteachers	88	148	68%	38	81	113%
Non-Ganda headteachers	59	89	51%	23	27	17%

a. All changes between years were positive.

b. The distinction between private and government schools is based only on whether the founding body was a private entity or the Ugandan government.

- Network schools mirrored the shifts in the larger population toward larger schools and more schools in rural areas.
- Network schools were less likely to cease operation than schools outside the network. Between 2000 and 2008, approximately 33 percent of the secondary schools started in the district closed or "collapsed," while only 20 percent of the 2002 network schools closed.

Network Structure

The "frequent interaction" network represents all ties identified by the head-teachers. Figure 11-1 presents the graphical network maps of these networks in 2002 and 2008. Together, these maps illustrate the growth of this network. The 2002 network has 182 ties among 61 headteachers, while the 2008 network has 327 ties among 118 headteachers. The six most central headteachers in each network are indicated on these maps. Two headteachers were among the most central in both 2002 and 2008. The six most central headteachers averaged 15 ties in 2002 and 22 ties in 2008, while the average number of headteacher ties for both years was 5 ties. In 2002, four of the six most central

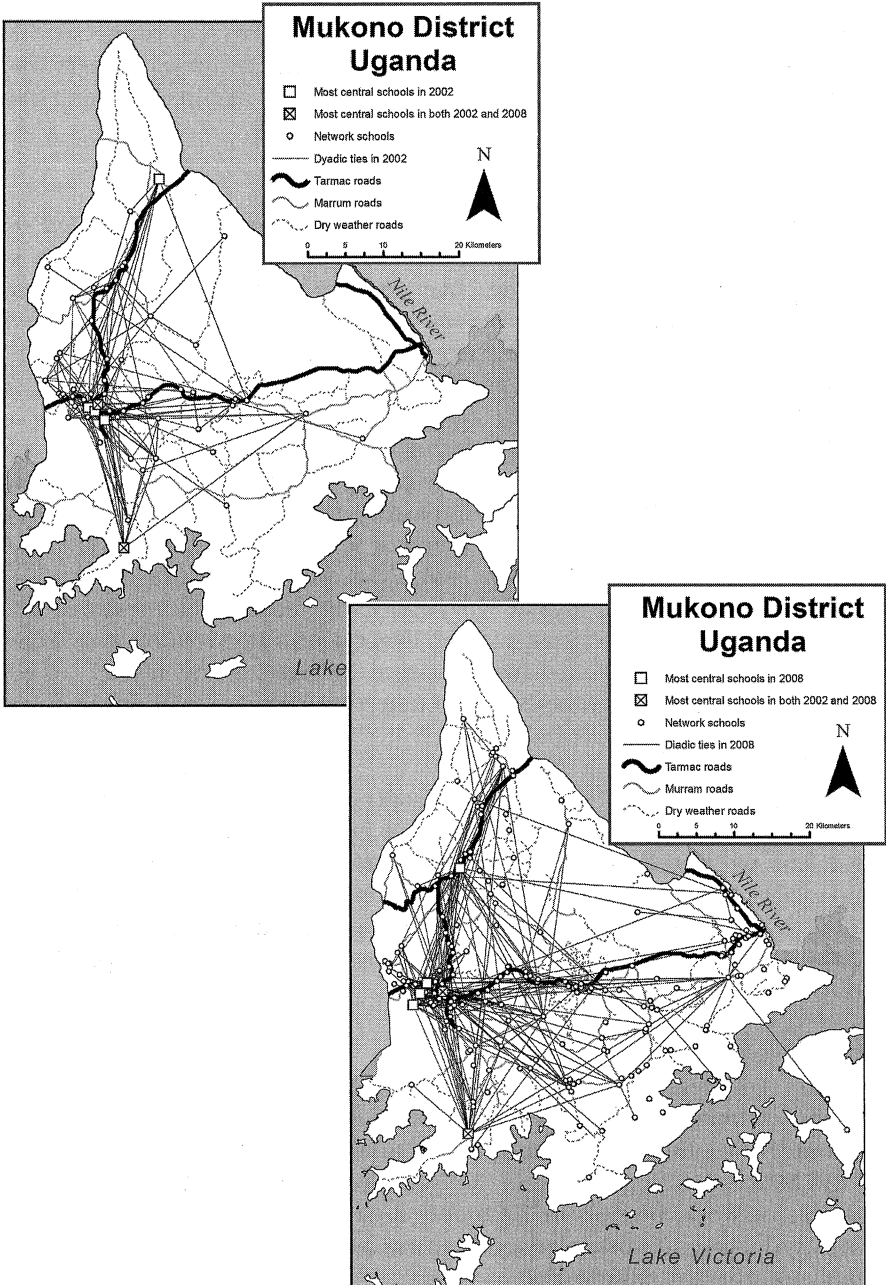**FIGURE 11-1 2002 and 2008 headteacher frequent interaction networks**
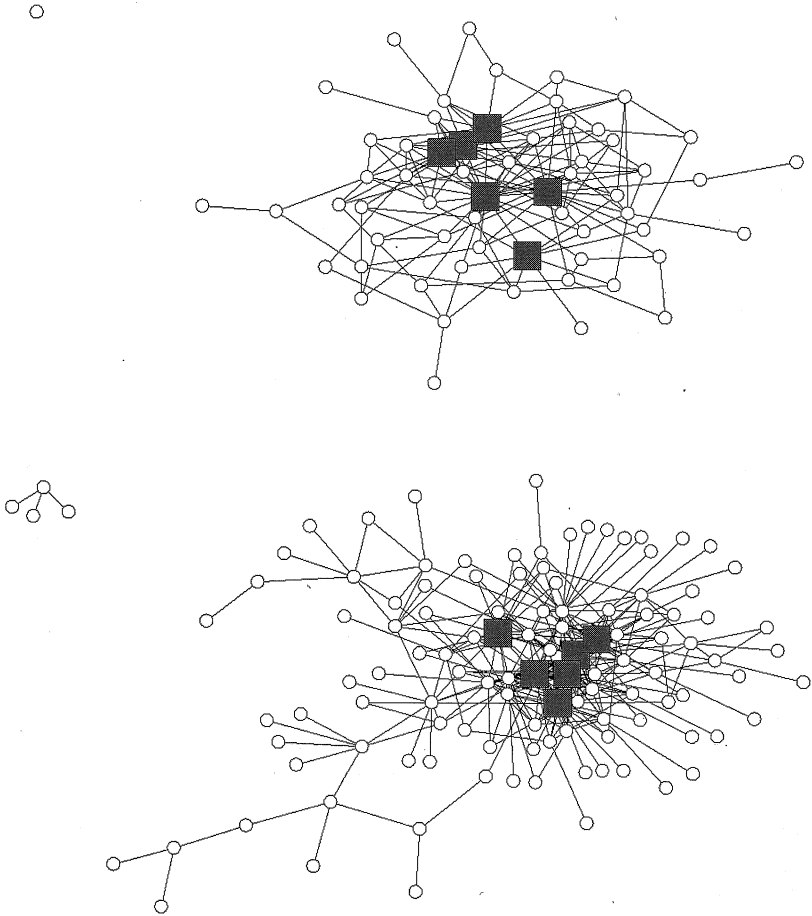
headteachers were at government schools. By 2008, two of these 2002 government schools had new headteachers, who had fewer ties than the previous headteachers, resulting in decreased centrality for these schools. Two other headteachers, also at government schools, rose in centrality to replace them.

Geographical Proximity

Figure 11-2 illustrates the geographical location of headteacher frequent interaction network ties in both 2002 and 2008. In 2002, the distribution of these ties clearly aligned with the tarmac roads, and the distance between

FIGURE 11-2 2002 and 2008 geographical location of headteacher frequent interaction network ties (Maps created by Dr. Patrick R. Wauro)

Mukono District Uganda

☐ Most central schools in 2002
☒ Most central schools in both 2002 and 2008
○ Network schools
┈┈ Dyadic ties in 2002
〰 Tarmac roads
〰 Marrum roads
〰 Dry weather roads

N

0   5   10   20 Kilometers

Mukono District Uganda

☐ Most central schools in 2008
☒ Most central schools in both 2002 and 2008
○ Network schools
┈┈ Diadic ties in 2008
〰 Tarmac roads
〰 Murram roads
〰 Dry weather roads

N

0   5   10   20 Kilometers

the schools predicted the existence of the ties.[40] By 2008, the growth of the network created a change in the geographical distribution of schools and the ties between their headteachers. While the tarmac road pattern is still evident, network ties expanded beyond the tarmac roads, and connectedness increased for schools in outlying rural areas. Of the two headteachers who were central in both years, one headteacher is still located in a southern outlying rural area well beyond the reach of tarmac roads.

Network Tie Homophily

Homophily patterns of frequent interaction ties were assessed based on schools and headteachers characteristics (see table 11-3). The concept of homophily suggests that headteachers create ties with other headteachers with similar demographics or school characteristics. Across both network years, headteachers did interact frequently with other headteachers of the same gender and at similar types of schools (private versus government). This homophily pattern may be explained by the fact that the majority of network headteachers were male and at private schools. Thus, these headteachers would be the most available network partners. Contrasting with 2002, headteacher ties no longer demonstrated tribal homophily in 2008. No pattern of homophily existed in either year for membership in MHTPA. The network contains two patterns of heterophily, demonstrating diversity of ties in school size and performance. This heterophily indicates that resource relationships were often between smaller, lower-performing schools and larger, better-performing schools. This difference indicates many resource flows were likely asymmetric (one-way) and suggests mentoring relationships.

Resource Networks

The four resource relations are subnetworks of the frequent interaction network. The network survey asked all of the headteachers which of the headteachers with whom they frequently interacted had provided them with financial, physical, human, and information resources. Figures 11-3, 11-4, 11-5, and 11-6 compare these four resource exchange networks in 2002 and 2008. Directional arrows in the graphical maps indicate where each headteacher went for these resources.

Financial Resource Network

Figure 11-3 presents the graphical maps for the financial resource network, which comprised the ties through which headteachers received financial resources. The number of schools in the financial resource network dropped from 28 to 17, losing 18 ties. In 2002 all 6 of the most central schools were in this network, whereas in 2008 only 2 of the most central schools were involved. Both networks were quite sparse, with very few ties relative to the frequent interaction network.

TABLE 11.3
School homophily and heterophily patterns[a]

	Frequent Interaction Network		Patterns and Trends
	2002	2008	
Headteacher gender	.64	.70	Homophily continuing
Headteacher tribe	.64	.48	Some homophily to no pattern
MHTPA	.51	.61	No pattern
School size	.32	.35	Heterophily continuing
Private versus government	.74	.66	Homophily contining
Performance	.27	.37	Heterophily continuing

>a. 1 = complete homophily, 0 = complete heterophily (.40–.60 would indicate no pattern)

Physical Resource Network
Figure 11-4 presents the graphical maps for the physical resource network. These ties represent headteachers' sources of physical resources. Both of these networks are more connected than the financial resource networks, and the 6 most central schools were found in both networks. While the whole frequent interaction 2008 network added 57 more schools, the 2008 physical resource network added only 13 schools—and the number of ties increased by only one. This pattern indicates that the 2008 physical resource network was less connected than that of 2002. However, the 2008 network demonstrated clearer patterns of centrality around the most central headteachers in the frequent interaction network.

Human Resource Network
Figure 11-5 presents the graphical maps for the human resource network, ties that indicate that one school receives help from another school to find teachers. "Sharing" teachers across schools is quite common in Uganda. Many teachers board at one school while also teaching at other schools. The 2008 network was much less connected than the network of 2002. While the number of schools sharing human resources increased from 44 to 66, the number of resource sharing ties actually decreased by 16. The centrality pattern in 2008 included all of the most central headteachers in the 2008 frequent interaction network (compared with five of six in 2002).

Information Resource Network
Figure 11-6 presents the graphical maps for the information resource network, the relationship whereby one headteacher provides information and new ideas to another headteacher. For both years, this resource network most
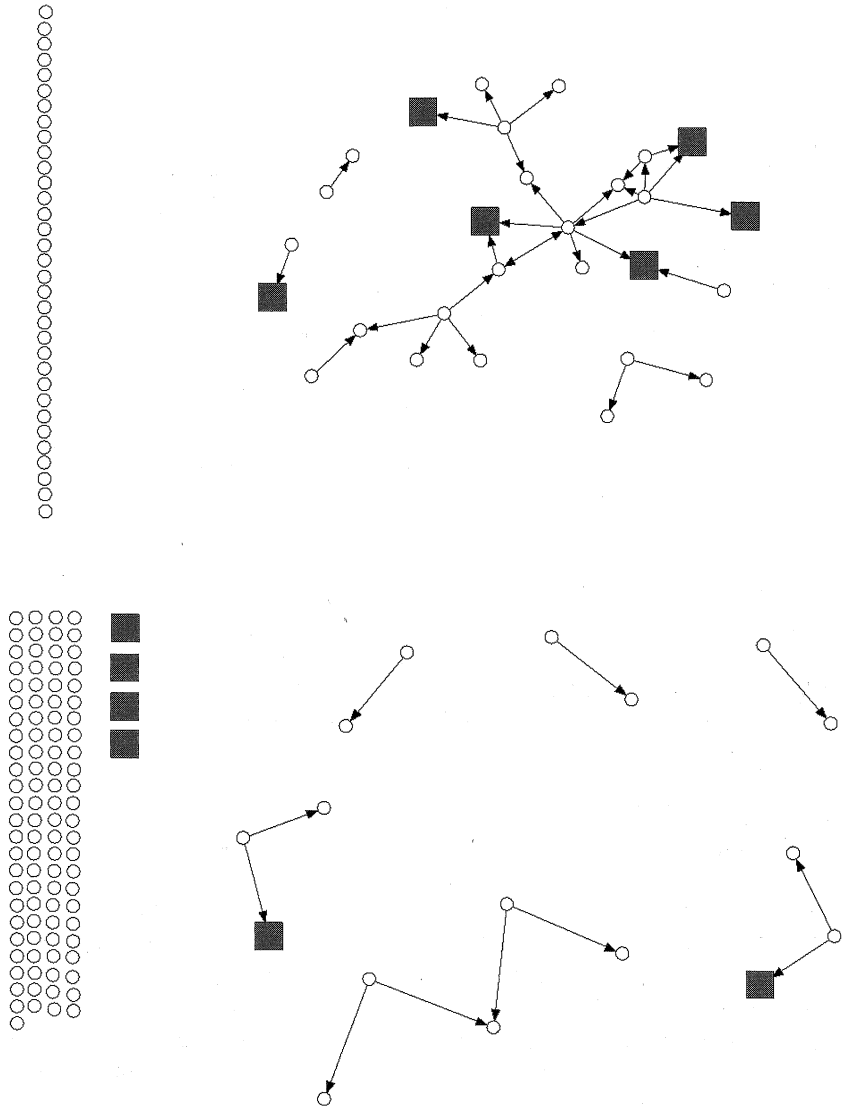
FIGURE 11-3 2002 and 2008 financial resource networks
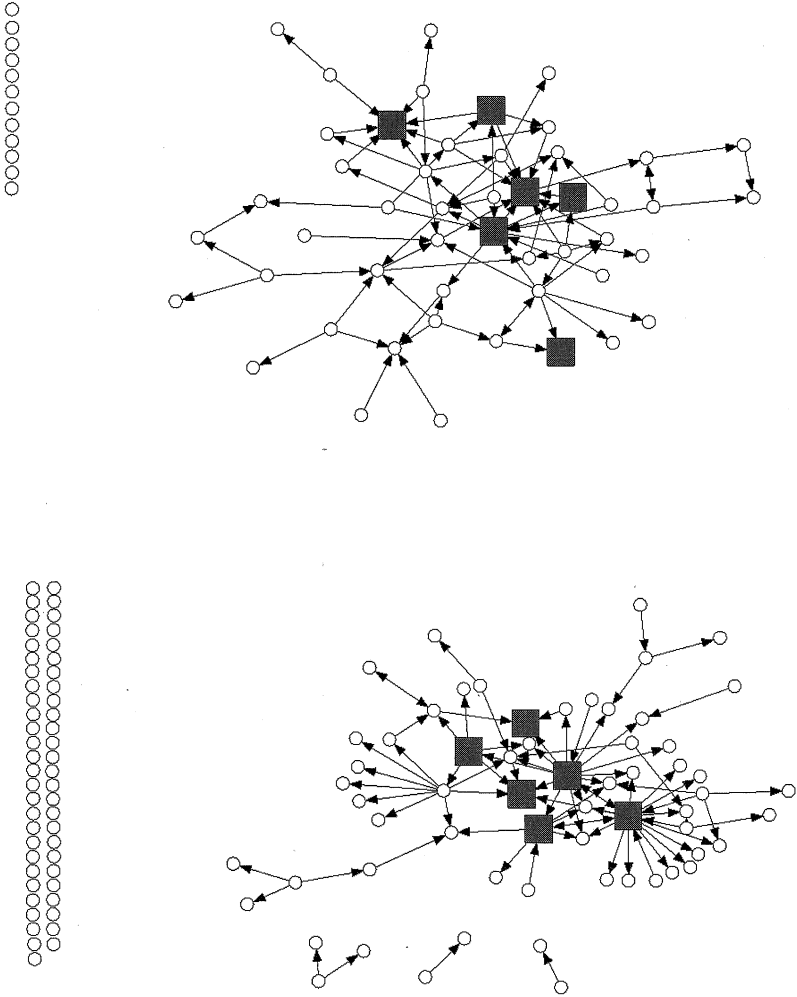
FIGURE 11-4 2002 and 2008 physical resource networks

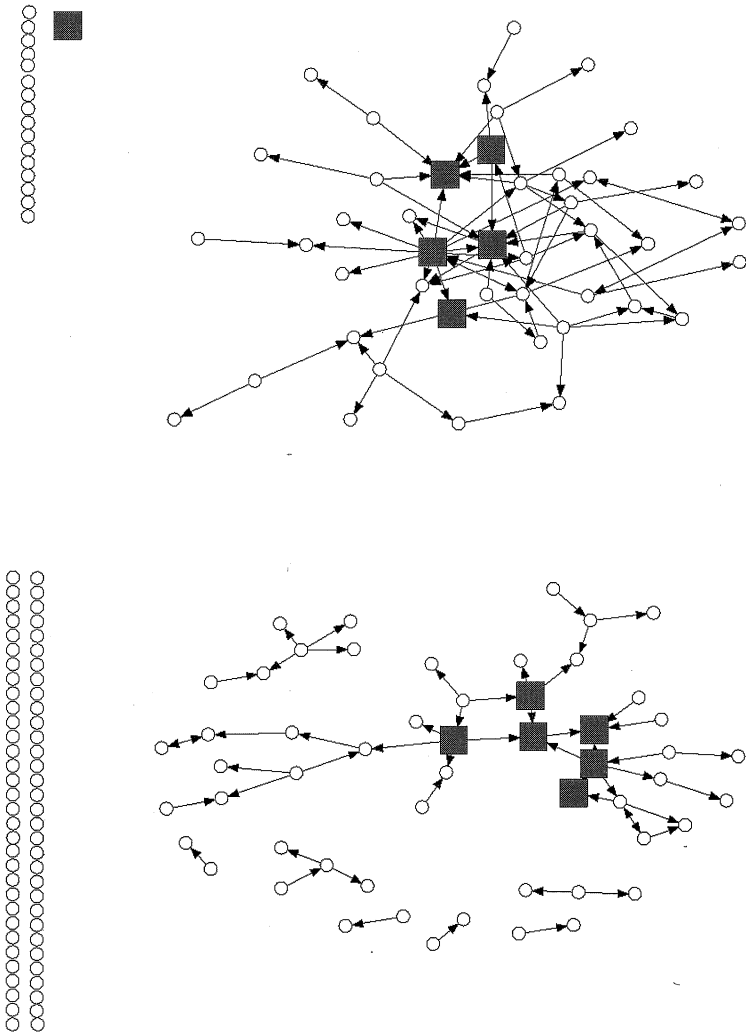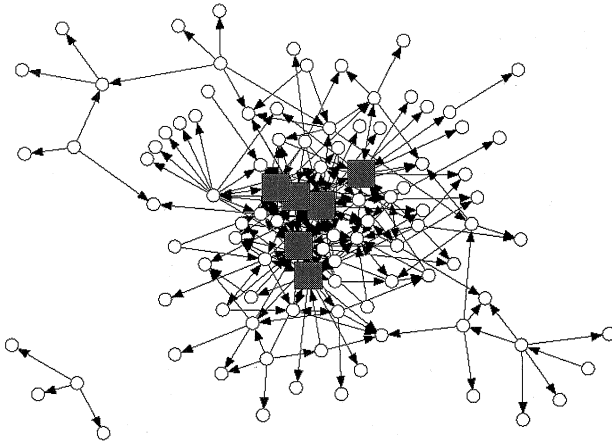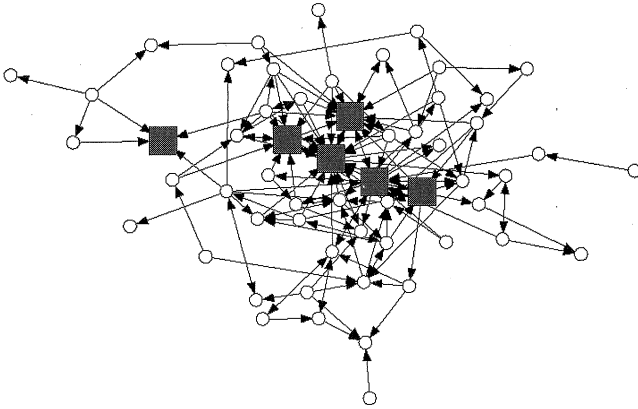**FIGURE 11-5 2002 and 2008 human resource networks**

Figure 11-6 2002 and 2008 information resource networks

closely resembled the frequent interaction network structure, and all six of the most central headteachers in the frequent interaction were connected in these networks as well. This network had the highest connectedness of all the resource networks in both years, and was the only resource network to have increased in connectedness over the years, even though 42 more schools were involved in 2008. As a result, the information network also had the lowest number of isolate or unconnected headteachers.

FUNCTIONS OF HEADTEACHER NETWORKS
FOR SCHOOL PERFORMANCE

Uganda's market-driven educational context provides an interesting setting for the study of school networks. Network theory provides a valuable lens for viewing how the relationships between Ugandan headteachers function to benefit schools and enhance educational performance. The nature of these networks in terms of connectedness, centrality, and homophily (having similar characteristics) highlights four key network functions that, in this context, are associated with the educational change efforts of headteachers: (1) school stability, (2) resource acquisition and exchange, (3) mentoring and learning, and (4) leverage for development of school-level ties. In Uganda, these functions can help secondary schools overcome market-driven educational challenges to enhance performance.

School Stability

Headteacher networks enhance the stability of schools. Market-driven and competitive environments make it difficult for schools to survive, particularly emerging private schools. Emerging organizations rely on their strong network ties to help nurture them through this process.[41] The most obvious change in the school networks over time has been the increase in the number of schools in the network. This increase has outpaced the number of new schools, suggesting that network development has been due not only to the creation of more schools but also to more headteachers reaching out and seeking connections to other schools. As more ties were built, the network developed, and the schools within the network benefited from the stabilizing forces of these headteacher relationships. Network partners can provide a critical infrastructure supporting emerging and struggling schools. For example, increased school stability was evidenced by schools in the 2002 frequent interaction network having a lower collapse rate than schools not in the network.

Headteachers can increase stability for their schools, which translates to their own employment stability, by creating ties with many other headteachers. As headteachers create more ties, the web of connectedness and structural embeddedness develops, pulling some headteachers closer to the

network core. Headteachers with more ties are more securely connected to the network than those with only one or two ties, which if lost unlink them entirely from the network. Their ties with headteachers from similar schools (homophily) provide stability through specific support for similar strategic needs. At the same time, their connections to headteachers from schools that differ in size and performance provide stability by reducing reliance on redundant resources, providing access to new types of resources, and building awareness of strategies from larger, better performing schools.

Resource Acquisition and Exchange

Headteacher networks provide conduits and pathways for resource acquisition and exchange. Given the resource-poor context, schools in Uganda must locate and access resources from their environments. As the network becomes increasingly connected, more pathways provide more potential network partners and more potential for the flow of resources within the network. Headteachers with more network ties decrease the school's dependence on any one resource relationship, providing greater security in acquiring vital resources from the environment.

The nature of the different resource networks has changed over time. The financial network was sparse in 2002; it was even sparser in 2008, suggesting that headteachers had shifted where they searched for financial resources. Given that USE provides government funding for some students, even in private schools, schools can look to this government source as a viable option for financial resources.[42]

Schools in 2008 also had fewer human resource network ties, likely due to increased market competition. Headteachers may have become less cooperative about providing or sharing teachers (human resources), as this resource is most directly related to academic performance. Headteachers continued to share physical resources such as desks, lab equipment and vehicles, which have less direct effect on school performance.

However, the information resource network grew dramatically. Information is the most easily shared resource, as sharing it does not deplete it.[43] The information resource network also most closely resembled the frequent interaction network, suggesting that much of the network interaction has involved the sharing of information and ideas. Sharing information resources may be less threatening, as the receiving school may not have the capabilities to use the information competitively. Thus in a competitive environment, information and physical resource sharing create less competitive risk than human resource sharing , yet still allow the schools to participate in the cultural norm of cooperation.

As a headteacher develops more ties and increases centrality in the network, these network partners are also more connected and can more easily broker the headteacher into resource-bearing ties elsewhere in the network.

Note that the most central headteachers in the frequent interaction network each year were also involved, most often centrally, in all of the resource networks except for the financial. Highly central headteachers have increased control over resources in the network, functioning as gatekeepers and brokers to resources that flow across the larger network.

Headteachers can also develop multiple resource flows within one tie, which strengthens the tie, providing an important strategy for the stability of the relationship. Additional resource acquisition can be layered on ties that initially serve other purposes.[44] For example, the similarity between the interaction and information resource network suggests that headteachers may create personal ties and then add other functions such as information sharing. Personal ties may be latent ties that can be activated when and if certain resources are needed.[45]

Mentoring and Learning

As increased competition intensifies a schools' needs for adaptive learning and change, headteacher networks create avenues for essential learning and mentoring.[46] These networks facilitate the flow of information and new ideas between schools, provide strategies for adaptation and improvement, and enable productive co-opetition. A highly connected headteacher has more potential learning partners than a more isolated headteacher. Knowledge within the network flows through network ties, is easy to share, and can enhance a school's capabilities for school improvement.

Many headteachers were involved in mentoring relationships in the network in which headteachers of larger, better performing schools mentored headteachers at smaller, lower performing schools that, often, were struggling to emerge and survive. Historical Ugandan norms of school cooperation had benefited most of these mentor headteachers' schools when they were new and emerging.[47] Surprisingly, cooperative mentoring relationships have continued despite the increase in competition for students. Mentor headteachers were generally at larger, more network-central schools with higher school performance, and thus higher school fees and more resources, than the schools of headteachers they helped. The pattern suggests that headteachers mentored those with whom they did not directly compete for students, and they provided resources that were shareable with low competitive risk. The critical support, information, and ideas received through mentoring enhances the emergence and stability of smaller, lower-performing schools. The finding of diverse school relationships contrasts with expectations of homophily. Headteachers networking up and mentoring down may provide a useful explanation of interaction in the resource networks. This asymmetric networking may facilitate educational change due to isomorphic processes, particularly in this increasingly competitive educational context.[48] Educational strategies and change may be easily diffused from higher-performing schools, allow-

ing lower-performing, more resource-dependent schools to gradually become more like them.

Leverage for Development of School-Level Ties

Headteacher network ties are fundamentally based on personal relationships. Given that headteachers often move to other schools, these personal relationships help ties stay intact.[49] For example, although the study found that that closer geographic distance predicts ties, two of the most central headteachers in the 2002 frequent interaction network worked at the greatest distance from their network partners, having retained personal ties developed when they had previously worked at a centrally located school in Mukono Town. When they both moved further away, their new schools benefitted from these ties, and their network partners easily established relationships with the new schools based on the prior personal connections.

This example also shows that a headteacher's personal ties need to become institutionalized at the school level for the long-term benefit of the school.[50] If headteacher ties do not become school-level ties, the school is at risk when (not if) the headteacher moves to another school. In the above example, the same two headteachers who left these central schools took their personal ties with them. Both schools lost network ties, which decreased their centrality so that they were no longer among the most central schools in 2008. The new headteachers at these schools came from different districts and did not know the headteachers in Mukono. Consequently, these schools lost ties and centrality and thus network conduits for accessing resources.

Headteachers, school directors, and school boards must strategically ensure that these connections, particularly for resource acquisition and exchange, remain intact when the headteacher moves. School-level ties begin with personal relationships between headteachers that create opportunities for interaction between other school administrators. As a rope becomes stronger with multiple threads, ties between schools are stronger when they include a variety of relationships serving multiple purposes.

Theoretical Implications for Network Theory and Education

The theoretical implications of this educational network research for social network theory are twofold. First, the value of integrating both social and geographical space informs how networks can be influenced by their larger contexts, and that social network research needs to account for the influences of these contexts. Second, this network research provides rich insights into network functioning because it directly explores the inherent multiplexity of network ties and content.

This research also informs network theory as it applies to education in at least three ways. First, education processes occur through the interaction and collaboration of educational stakeholders, such as headteachers or principals,

as network actors. Second, interaction within educational networks can have critical strategic outcomes for schools, as in the case of these resource networks. Third, educational stakeholders do not operate within a vacuum in education; rather, they must account for the larger social contexts in which they function, as is the case in the market-oriented and highly competitive environment of Ugandan education.

Practical Implications for Educational Leaders

Headteacher networks increase school stability; create critical conduits for acquiring resources, learning, and mentoring; and provide leverage for the development of school-level ties. As a result, school performance can be enhanced, more students can be attracted to the school (providing financial resources), and school survival will be more likely in the market-driven environment. School, district, and national MOES leaders in education, recognizing the value of developing strategic relationships between headteachers and between schools, can proactively promote and support network development.

Headteachers can proactively seek to interact with other headteachers, intentionally building mutually beneficial ties for seeking and sharing information and other resources. As headteachers come together to create formal networks, such as the MHTPA, they build critical infrastructure that contributes to school survival and performance. They can also help to leverage and facilitate the development of multiple ties between their schools.

The MOES and district leaders must support the creation of both formal and informal school networks by providing and supporting formal and informal opportunities for interaction. They can facilitate strategic brokering of headteacher relationships and encourage formal associations for headteacher support, such as the MHTPA. MOES can also create its own network ties to central headteachers to leverage information distribution. In this way, national and district leaders can help ensure school survival and thus help accomplish national educational policies of UPE and USE and international goals of EFA.

Headteacher and school networks can be a strategic stabilizing force in localization and decentralization endeavors critical to UPE, USE and EFA. With formal and informal network infrastructures in place, the MOES can more confidently manage decentralization of critical functions and funding by tapping into information flows that pass through these network-central schools to calibrate the status and progress of localization and decentralization efforts. Headteacher and school networks can also encourage diffusion of new ideas and alleviate enforcement needs that would otherwise require more costly policies and mechanisms.

CONCLUSION

Network theory provides a valuable lens for understanding how the relationships between headteachers and the larger structure of these relationships influence educational processes and outcomes. Network relationships are more than simple lines drawn between schools: These ties have the potential to be rich mediums of critical resource acquisition and exchange. Any effort toward school improvement and positive change requires critical resources. Resource-poor educational contexts, such as Uganda, exist throughout the world. Effective strategies for acquiring school resources are therefore particularly crucial for generating and sustaining effective educational change and improvement. This research indicates that educational leaders need to strategically craft and nurture interschool network relationships, building conduits for the flow of critical resources to support improvements in the quality, equity, and access of education at their schools.

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CHAPTER 11

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[(# students @ 1 x 1) + (# students @ 2 x 2) + (# students @ 3 x 3) + (# students @ 4 x 4) + (# students @ 7 x 5) + (# students @ 9 x 5)]/ (total # students) = School average

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