Innovative work behaviour: mapping out the knowledge sharing behind it.

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Research into the role of a central network position for innovative work behaviour of educational professionals and the mediating role of task conflict.

Abstract

Today's schools endlessly face challenges through new demands of the 21ste century. Educational professionals are responsible for the implementation of educational improvements and hereby rely on knowledge sharing processes in their organization, as these are crucial for the development of new ideas and knowledge. This study investigated whether a central position in a knowledge-sharing network stimulate innovative behaviour of educational professionals. Moreover, it was attempted to clarify this relationship by exploring the mediating role of task conflict. Six teams from a university of applied sciences and an educational advice organization participated. The knowledge-sharing network was visualised through social network analysis, which provides insight into the flow of knowledge in teams. Quantitative surveys were used to measure innovative behaviour and task conflict. It was found that actively sharing ideas in a team stimulates innovative behaviour. This finding contributes to educational practice because it creates awareness for educational institutions that knowledge sharing in teams should be stimulated, as this can be a valuable contribution to the implementation of educational improvements. No evidence was found for the mediating role of task conflict. However , a suggestion was made that conflict management should be added as a control variable, as this is needed to benefit from task conflicts.

Keywords: *social network theory, centrality, knowledge sharing, innovative work behaviour, task conflict, educational professionals.*

Introduction

The school of today continuously faces challenges that evolve from the new demands of the 21ste century. Above all, technology is becoming increasingly important in our lives and educators are being asked to integrate this technology into education (Bitner & Bitner, 2002; Dockstader, 1999). Additionally, due to a shift from an industrial society to a knowledge society (Bell, 1973), emerging jobs require different skills that should be taught in education. Therefore, in order to remain relevant for the upcoming changes of the time, education needs to continue to develop its curriculum (Voogt, & Pelgrum, 2005). As educational professionals are responsible for going along with these developments and for implementing essential innovations in schools, research into the aspects that support this innovative work behavior becomes crucial. Furthermore, educational institutions will be better able to stimulate this behaviour when they are aware of what factors underlie this behaviour.

In order to come up with new ideas to improve education, educational professionals depend on the process of knowledge sharing within their organization (Armbrecht et al., 2001). Despite the recognition of the importance of someone's own knowledge, interactions between individuals are crucial for the actual development of new knowledge and ideas (Nonaka, 1994). This process of knowledge sharing contributes to individual learning, as if someone's shares his/her knowledge, knowledge acquisition by other individuals may occur (Andrews & Delahaye, 2000). When individuals receive knowledge from their connections with other individuals, they can build upon this knowledge to create new knowledge and practices (IPE, 2003; Van den Bossche, 2006; Swart & Kinnie, 2003). Similary, Paavola and Hakkarainen (2005), Engestrom (1999) and Nonaka and Tackeuchi (1995) emphasize knowledge sharing is the basis for renewal and innovation.

This study investigates whether educational professionals who are in the centre of the knowledge sharing processes are more innovative in their work behaviour. Other research in the educational field have already found that knowledge sharing is related to the innovative climate in school settings (Moolenaar, Daly, & Sleegers, 2011) and to school interventions (Frank, Zhao, & Borman, 2004). In this context, the present study makes an valuable contribution to the available literature by exploring the role of the position in the knowledge-sharing network for innovative work

behaviour of educational professionals, as no previous research have linked these concepts. However, the question arises why educational professionals who have this central network position are more innovative in their work behaviour. This work suggests that an explanatory factor for this relationship may be the degree of perceived task conflict.

Task conflict is defined as a disagreement between individuals about the content of a work-related task (Jehn, 1995). To prevent or reduce the presence of conflicts, most organizations invest a lot of money in team building and conflict management (Slaikeu & Hasson, 1998). Furthermore, early research on conflicts in teams mainly focused on the negative consequences of conflict (Jehn, 1995). However, there is increasing evidence that employees can learn from conflicts and that certain types of conflicts have the potential to contribute to innovation (De Dreu, 2006; De Dreu & West, 2001; Jehn, 1995; West, 2002). This because task conflict promotes team members to scrutinize problems and tasks and to engage in a deeper processing of the task-relevant information, which, in turn, stimulates the development of new and creative insights (De Dreu, 2006).

This study suggests that educational professionals who are central in the knowledge-sharing web face multiple different perspectives from other educational professionals, which increases the chance of experiencing task conflict that, in turn, could lead to more innovative work behaviour. This study is the first to explore the mediating role of task conflict in the relationship between an individual's position in a knowledge-sharing network and innovative work behaviour.

The next chapter provides an overview of the theoretical concepts relevant for the present study. Drawing on these concepts, hypotheses are posed regarding the relationships between an individuals' position in a network, the innovative work behaviour and perceived task conflict. The main research question addressed in the present study is: *To what extent is a central position in a knowledge-sharing network related to the innovative work behaviour of educational professionals, as mediated by perceived task conflict?*

Theoretical background

Innovative work behaviour. In order to meet the challenges from the 21ste century and to continuously implement educational innovation and improvement, innovative work behaviour of educational professionals is needed (De Jong & Den Hartog, 2010; Janssen, 2000; Van de Ven, 1986). This study aims to investigate how this kind of behaviour is established, because if this is known, practitioners can influence this behaviour. In this study innovative work behaviour (IWB) is defined as 'the intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group, or the organization" (Janssen, 2000, p288.). Whereas some literature limits IWB to just the development of new ideas, the concept of IWB as used in the present study is both about the initiation and the implementation of ideas; therefore it covers the entire process of innovation.

IWB is divided into three stages, namely: idea generation, idea promotion, and idea realization. Idea generation relates to the production of novel and useful ideas (Woodman, Sawyer, & Griffin, 1993). During the stage of idea promotion, an individual has to motivate and encourage other parties to support the idea in order to have sufficient backing in the final stage of IWB, i.e. idea realization. Idea realization concerns the actual application of a new idea in the organization (Kanter, 2000).

The impact of individual innovative actions can range from improvements of daily work designs and processes, to an impact on theories, products, or practices across the whole organization (Janssen, 2003). An example of IWB of educational professionals is that they can come up with ideas on how to integrate problem-solving skills into the current curriculum at school. These educational professionals can share these ideas with their colleagues and convince them about the added value of these ideas for the school. Finally, if educational professionals need help for the implementation of the idea, some colleagues can support them in this final stage.

Previous studies in different fields beyond education have already found that IWB is positively affected by job engagement (Agarwal, Datta, Blake-Beard, & Bhargava, 2012), organizational culture (Hartmann, 2006) and career stage (Scott & Bruce, 1994). This study investigates the relationship between knowledge sharing and IWB.

Knowledge sharing and IWB. Knowledge processes in organizations are researched more and more extensively, as they are seen as essential sources for success and long-term sustainability of organizations (Nonaka & Takeuchi, 1995), as well as important resources for innovation and renewal (Bontis, 1998). Successfully managing knowledge within organizations relies on the sharing of knowledge through interactions between individuals (Brown & Duguid, 1991). Knowledge sharing occurs when individuals make their knowledge available for others in the organization (IPE, 2003). Educational professionals can use the knowledge of their colleagues to create new knowledge and innovative ideas for the improvement of education (Nonaka, 1994). Knowledge sharing has been found to be critical for new knowledge creation, individual- and organizational learning, as well as for performance achievement (Andrews & Delahaye, 2000; Bartol & Srivastava, 2002). In the context of innovations, earlier research has found that knowledge sharing is essential for an innovative climate in schools (Moolenaar, Daly & Sleegers, 2011), for successful school interventions (Frank, Zhao, & Borman, 2004), a well as for enhancing a firm's innovation capability (Lin, 2007).

While previous research has already found a positive relationship between knowledge sharing and innovations, no studies have addressed it in relation with IWB of educational professionals. As knowledge sharing is considered to be essential for the development of new ideas and knowledge (Nonaka, 1994), the present study investigates whether a central position in a knowledge-sharing network, rather than a less central position, will positively affect IWB of educational professionals. In this study, the knowledge-sharing network is visualised through social network analysis. Social network analysis provides an insight into the flow of knowledge and information between individuals in a network (Borgatti, Everett, & Johnson, 2013) and it is used to examining the centrality of the network position.

The position of an individual in a network is associated with that individual's access to and control over the distribution of knowledge and resources, which provides opportunities for individual actions and IWB (Burt, 2000; Kilduff & Tsai, 2003). Educational professionals who are more central in the knowledge-sharing network have a greater access to knowledge and information in the network, as compared to the educational professionals who are less centrally located (Balkundi & Harrison, 2006; Tsai, 2001; Tsai & Goshal, 1998). Furthermore, the more connections an individual has with

others in the network, the greater the chance he/she finds the information he/she needs (Borgatti, Jones, & Everett, 1998) or to find novel information (Balkundi & Kilduff, 2006). What is particularly valuable for IWB is that central actors have the opportunity to combine all knowledge received from their connections into new knowledge and practices (Daly & Finnigan, 2010; Tsai & Goshal, 1998).

Based on the arguments outlined above, it is believed that a great access to information and knowledge from other individuals in a network is valuable for IWB, as, in the context of the present study, it provides educational professionals with the chance to build upon that knowledge and information to create new and useful ideas.

A distinction should be made between direct access and potential access to information and knowledge from the network. Making use of social network analysis, the former is measured by in-degree centrality which shows the popularity of an individual in the network and is defined as the number of direct incoming relationships an individual has with the others in the network (Freeman, 1979). If an individual has many direct in-coming relationships, this means that he/she receives information and ideas from many others in the network. Potential access is examined by closeness centrality and reflects how closely and individual is linked to others in the network (Freeman, 1979).Whereas in-degree centrality accounts only for the access to information from direct relations, closeness centrality says more about the access to information from the entire network. However, both direct access and potential access are closely related, since the more direct relationships an individual has, the easier the access to the entire network. Therefore, this study expects that both in-degree centrality and closeness centrality are positively related to IWB. In view of the above, the following hypotheses can be formulated:

H1: *A higher level of closeness of an individuals' position in a network will positively affect IWB.*

H2: *A higher level of in-degree of an individuals' position in a network will positively affects IWB.*

Perceived task conflict. A variable that is associated with both concepts of knowledge sharing and IWB, is task conflict.

Due to the interdependency of group members and the complex tasks to perform within organizations, conflict is inevitable in organizations (Jehn, 1995). Scholars mostly differentiate between two types of conflict in the workplace, namely: affective conflict and task conflict (De Dreu,

2006; De Dreu & Weingart, 2003; Jehn, 1995; Simons & Peterson, 2000). Affective conflict involves disagreements about personal tastes, values, interpersonal styles or political preferences (De Dreu, 2006). Previous studies cohere in that this type of conflict is considered to be dysfunctional for a work group and that it does not contribute to innovation (Amason, 1996; De Dreu, 2006; Jehn, 1995, 1997). Consequently, affective conflict is not included in the present research. Task conflict is defined as a disagreement about the content of the task and occurs when team members debate about their different views (Jehn, 1995). Unlike affective conflict, task conflict has the potential to contribute to IWB (Amason, 1996; De Dreu, 2006) and, moreover, can contribute to team creativity (Fahr, Lee, & Fahr, 2010) and team performance (Jehn & Chatman, 200).

Whereas most of earlier research has focused on conflict on team level (Jehn, 1995), the present study examines the task conflict on the individual level. From this individual-centred perspective, task conflict can be interpreted as they way an individual perceives the degree of conflict with other group members on task related issues.

Task conflict in relation to IWB. Before exploring the mediating role of task conflict in the relationship between a central network position and IWB, the direct relationship between task conflict and IWB will be analysed. After reviewing the literature about this potential relationship, two different views have been found. In the first section, arguments for a linear relationship will be described; in the next section, arguments for a curvilinear relationship are provided.

Task conflict has the potential to contribute to learning and innovation, as it promotes the exchange of ideas (Amason, 1996) and deep processing of task-relevant information (De Dreu, 2006). If team members disagree about the task, they exchange information in a way that the status quo is re-evaluated and the opposing solutions are explored. This stimulates the development of new ideas and solutions (West, 2002, De Dreu, 2006). Also, managing competing perspectives, which is characteristic of task conflict, is essential for generating creativity and innovation (Tjosvold, 1998). Finally, as argued by Jehn (1995), task conflict leads to a more critical evaluation of the task related problems and information.

Although the arguments above tend to support a positive linear relationship between perceived task conflict and IWB, this relationship may not be as straightforward as it may seem. Other evidence

has been found for the positive relationship between task conflict and innovation; however under the condition that the level of task conflict was moderate (De Dreu, 2006). If the task conflict intensity is too high, the innovative performance of an individual will be negatively influenced due to the produced stress, interpersonal tension and information overload (De Dreu, 2006). This reduces the ability to perceive, process and evaluate relevant information, which, as a results, may hinder innovation (Leenders, Van Engelen & Kratzer, 2003). Moderate task conflict in a team ensures deeper consideration of the alternatives, better integration of the relevant information, and, eventually gives a stronger impulse to improve the current situation (Jehn, 1995; Leenders et al., 2003).

Given the contrasting views and inconsistency in the literature about the degree of task conflict that is related to IWB, two different hypotheses can be formulated, one suggesting a linear relationship, the other proposing a curvilinear relationship.

H3: *A higher level of perceived task conflict will be positively related to IWB.*

H4: *Moderate perceived task conflict will be positively related to IWB.*

The mediating role of perceived task conflict. In case of a linear relationship between task conflict and IWB, the mediating role of task conflict in the relationship between a central network position and IWB will be tested. By doing this, the three areas studied (see Figure 1) are brought together with the aim of establishing why educational professionals who are central in the knowledge-sharing network, show more IWB. In case of a curvilinear relationship, no mediation will be tested, because it exceeds the possibilities of the present research.

Educational professionals who hold a central position in their network share knowledge with many other professionals. The more people an educational professional shares knowledge with, the bigger the chance that he/she is confronted with different and conflicting perspectives and opinions (Smith et al., 1994). This confrontation gives the educational professional the chance to combine the different perspectives into new knowledge and ideas. Therefore, this study states that educational professionals who are central in the network show more IWB because they experience more task conflict.

Based on this argument, the final two hypotheses formulated in the present study are as follows:

H5: *Perceived task conflict will have a mediating role in predicting individuals' IWB by the centrality of a network position (in terms of in-degree centrality).*

H6: *Perceived task conflict will have a mediating role in predicting individuals' IWB by the centrality of a network position (in terms of closeness).*
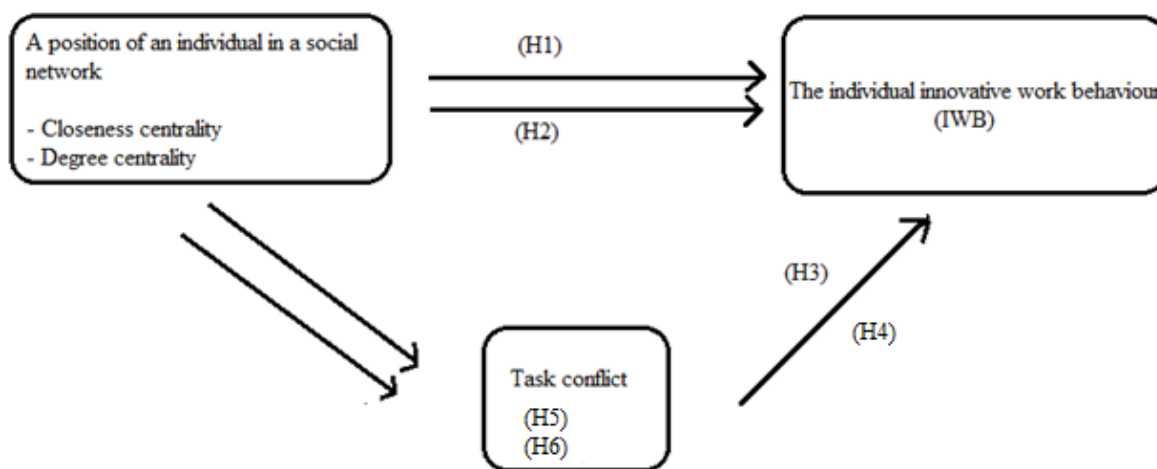

Figure 1. *Conceptual model*

Method

Research design

This research was of a descriptive nature. To examine the research question and the hypotheses, a social network analysis and a quantitative data survey were used. The results of the social network analysis provided an insight into the social network position of educational professionals in different teams. A great advantage of this analysis technique is that it provides rich and more detailed data compared to a survey about knowledge sharing. Moreover, it shows the amount of knowledge shared by the individuals, as well as who they share that knowledge with. Therefore it shows the actual knowledge sharing in teams through connections between team members. A survey was used to describe the IWB and perceived task conflict.

Context

This study was conducted in two educational institutions located in the Randstad. These organizations were chosen because they are both actively working with educational improvements and innovations. The first organization was an educational advice organization that helps schools with implementing innovations to improve their education services. The second organization is a university of applied sciences that is currently implementing internal educational innovations.

Participants

The research group consisted of three teams from the educational advice organization (team 1,2, 3) and three teams from the university of applied sciences (team 4, 5, 6). Data were collected from 126 members of these organizations (N=126), which indicated an overall response rate of 86%. 74,6% of the participants were female (N=94). The average response rate within the responding groups was 76,8% and the average team size was 29 team members (See Table 1 for the amount of team members and the response rate per team). Additional sample characteristics are included in Table 2.

Table1

Response rate and team size (N=126)

Teams	N	Response rate
1	45	98%
2	27	78%
3	14	86%
4	23	57%
5	21	67%
6	16	75%

Table 2

Sample demographics at individual level (N=103*)

	N	M	SD	Min.	Max.
Age	103	42,01	10,53	26	64
Experience in organization	103	9,49	6,66	1	30
Experience in team	103	8,36	6,19	1	30

* Team 4 was not included due to its response rate being too low for performing a reliable social network analysis.

Procedure

First, a meeting was planned with the managers of the two organizations to discuss the value of this research for the organization and how the data collection process would take place. In return for participating in this research, the organization gained insight into collaboration and knowledge sharing of its teams, their perceived task conflict and their IWB. Due to social network analysis, the managers of the organizations received an overview of the social interactions in their teams after this study was completed. This overview showed who is actually working together with whom in the team and how knowledge about educational innovations flows through the network.

It was important to inform the manager about the high response rate needed for social network analysis, so that he/she could motivate the team members to complete the questionnaire. In addition, it was essential to explain the anonymity of the research. Because of social network analysis, the names of the team members were needed in order to map out the network. After the network was visualised, the names were removed and the results were fed back and reported anonymously.

The questionnaire started with some demographic questions about the age, gender, and work experience of the participants. Afterwards, the participants had to respond to the social network question where they had to choose with whom in their team they shared ideas about educational innovations. The team members' names were listed in alphabetical order. Finally, the questions about task conflict and IWB were presented.

146 members of the two organizations received an email with a link to the online questionnaire and the deadline for completing the questionnaire. A reminder email was sent twice to the participants who had not filled in the questionnaire yet. In order to recruit a sufficient number of participants, the managers sent a final reminder email to their teams. After the data analysis, an appointment with the managers from the organizations was made to discuss the results of the present study that were relevant for the organizations.

Pilot

A pilot research was performed to test the face validity and the reliability of the surveys used in this research. Fifteen individuals working in an educational setting participated in this pilot. These participants were not included in the final sample of the research. Since the reliability of both surveys was high, no changes were made to the questions that were used. The participants preferred a five-point Likert scale over a seven-point Likert scale; therefore, the original scale of the IWB survey was changed accordingly..

Instruments

Social networks. The independent variable of this research was the centrality of an individual's social network position. This variable was measured using social network analysis. Since both participating organizations are engaged in educational innovations, the following network question was asked: *With whom do you share your ideas about educational innovations?* Sharing ideas about work related issues is essential for the diffusion of new knowledge and, therefore, an important resource for IWB of educational professionals.

Innovative work behaviour. The dependent variable in this research was IWB. The innovative work behaviour scale of Janssen (2000) was used to test this variable. The scale consisted of nine items (Table 3) to be rated on a five-point Likert scale (1 = "totally disagree"; 5 = "totally agree"). A factor analysis was conducted to assess whether a single or multi-dimensional scale was present. The nine items were entered into a Principal Component Analysis without rotation and

resulted in an one-factor solution that explained 53,1% of total variance. The factor loadings ranged between .665 and .805. Cronbach's alpha was $\alpha = 886$, which is a good score for reliability based on the Cotan criteria. This result of a single scale is in line with previous research on IWB (De Jong & Den Hartog, 2010; Janssen, 2000; Reuvers, Van Engen, Vinkenburg, & Wilson-Evered, 2008; Scott & Bruce, 1994). For example, Janssen (2000) attempted to find a multi-dimensional measure of IWB including the concepts idea generation, promotion and implementation. However the author found strong correlations between the three concepts and, therefore, concluded that the items should be combined into one single scale.

Both original surveys of IWB and task conflict were written in English. Since the sample of the present research consisted of Dutch organizations, the questions from both surveys were translated into Dutch (see Appendix A). To guarantee that the quality of the questions was not violated due to the translation, the Dutch questions were back-translated into English. The back translation caused no changes.

Table 3

Items of the IWB scale and factor loadings

	Innovative work behaviour ($\alpha = .886$)	I
1	I create new ideas for difficult issues.	.81
2	I make important organizational members enthusiastic for innovative ideas	.80
3	I mobilize support for innovative ideas.	.75
4	I search out new working methods or instruments to improve my work.	.72
5	I transform innovative ideas into useful applications.	.72
6	I introduce innovative ideas into the work environment in a systematic way.	.72
7	I evaluate the utility of innovative ideas.	.71
8	I acquire approval when I come up with something new.	.67
9	I generate original solutions for problems.	.66

Task conflict. In this study, perceived task conflict was the mediating variable and was examined by an intragroup conflict survey that originally consisted of eight items (Jehn, 1995). Jehn (1995) distinguished between relational conflict and task conflict and measured conflict on the team level. As this study only examined task conflict, four items addressing relational conflict were not included. The remaining items were changed so that to measure the individual perception of task conflict and to fit the context of the sample (see Table 4). For example, the item "*How frequently are there conflicts about ideas in your work unit*?" was changed into "*I have conflict about ideas in my team*".

Perceived task conflict was measured on a five-point Likert scale (1 = "totally disagree" ; 5 = "totally agree". Principal Component Analysis extracted one component, meaning that all four items contributed to a single factor solution. This factor accounted for 61.2% of the total variance. Cronbach's alpha was $\alpha = .76$, which is a sufficient score following the Cotan criteria for reliability.

Table 4

Items of the Perceived task conflict scale and factor loadings

	Perceived task conflict ($\alpha = .762$)	I
1	I have conflicts about ideas in my team	.84
2	I have conflicts about the work that I do	.83
3	I disagree about opinions regarding the work being done	.78
4	I have differences of opinion in my work unit	.67

Analysis

Social networks. Social network analysis was used to examine the interpersonal relations in a team. Two different social network characteristics were measured on the individual level: closeness (in-closeness and out-closeness) centrality and in-degree centrality (Borgatti et al., 1998). Both measurements examined the extent to which an individual has a central position in a network. It was predicted that these variables are related to IWB and the perceived task conflict. These variables were

measured using UCINET 6.0 (Borgatti, Everett, & Freeman, 2002). In-degree provided an insight into how often the individual was chosen by the others from the network (Freeman, 1979). In-degree centrality reflected the direct access to information, as such it only included the information from direct relations in the network. It was calculated as the number of ties received by an individual divided by the team size. If an individual scored high on in-degree centrality, it meant that other team members often share their ideas about educational innovations with this individual. The standard deviation reflected the variability among team members in the amount of in-coming relationships.

Closeness centrality was measured in terms of in-closeness and out-closeness and concerned the distance of an individual from and to others in the network, respectively (Shih, 2006). These measures reflected the potential access to information from the entire network. It was calculated as one minus the sum of the shortest paths between an individual and his team members (Moolenaar, Daly, & Sleegers, 2010). The higher the score on in-closeness, the more reachable the individual is for others in the network. In the present study, this meant that team members could easily reach the educational professional to share their ideas with him/her. The higher the score on out-closeness, the easier it is for an individual to approach others in the network. In the context of the present research, this entailed that the educational professional could easily approach others for sharing his/her own ideas with and therefore showed the activity of an individual in the entire network. In order to prevent a misunderstanding about the related concepts of out-closeness and in-closeness, different terms were used to describe the results associated with these concepts. When talking about the concept of out-closeness, it was explained as approaching others, when speaking about in-closeness, reaching the individual was used as a description. The standard deviation of closeness reflected the variability between team members in their reachability in the network. To enable comparisons between educational professionals in different teams, both the in-degree score and the closeness centrality scores were normalised. Both measures ranged from 0 (= the individual is not central at all) to 1 (= the individual is very central in the team).

Final sample. In the process of data analysis, the sample used in the present study was narrowed down to N=103, as team 4 was excluded due to a low response rate (57%). Such a low

response rate could have compromised the reliability of social network analyses. Therefore, this team was not taken into account in the subsequent analysis.

Analysis steps. Testing the hypotheses unfolded in five steps. First, descriptive statistics were performed to analyse the variables IWB, task conflict and the social network measures. T-tests were computed to further analyse the descriptive statistics. The network of two teams was displayed to show how differences in social network measures visually looked like. Second, correlations among the variables individuals' central network position, IWB and task conflict were examined to analyse their relationships. Before measuring these correlations, different assumptions were tested. The assumptions of linearity and homoscedasticity were not violated and the data of this sample were normally distributed; therefore Pearson correlation was chosen for computing the correlations. In the analysis, a significance level of $p \leq .05$ was maintained. No outliers were removed from the sample, as there were no significant differences between the results including outliers with a standard deviation bigger than two, or without these outliers. Third, single regression analyses were performed for the significant correlations. Fourth, an analysis of variance (ANOVA) was done to explore the possible curvilinear relationship between task conflict and IWB. Hereby, the participants of the sample were divided into three groups based on their level of perceived task conflict, namely: groups with a low, moderate or high level of perceived task conflict. The ANOVA was used to test if these groups scored significantly different on IWB. Finally, a multiple regression analysis was done to assess the mediating role of task conflict in the relationship between individuals' central network position and IWB. This regression analysis was performed three times: once for the independent variable (in)degree centrality and two times for in- and out-closeness centrality, because of the interdependency between these three social network measures.

Results

Descriptive analyses

Table 5 presents the descriptive statistics on individual level for the social network measures and the variables IWB and task conflict. First, a 55.3% score on out-closeness (M=0.43 SD=0.08) and

a 43.4% score on in-closeness (M=0.43, SD=0.08) showed that the individuals are relatively close to their team members. On average, individuals scored higher on out-closeness compared to in-closeness, which indicated that an individual approaches his team members more easily to share their ideas, than others could reach the individual for sharing their ideas with. In other words, this meant that individuals receive fewer ideas than they spread. This difference was also found statistically significant $t(102)=7.80$, p=.00,<.05. The standard deviation of out-closeness was higher than the standard deviation of in-closeness, which indicated there was more variation among team members in their ability to quickly approach others.

The score on in-degree (M=0.29, SD=0.16) indicated that on average 29.3% of the team members have a 'sharing ideas' relationship with the individual. In other words, on average, the individuals received ideas from 29.3% of their team members. The standard deviation of in-degree was relatively high, indicated there is much variation among individuals in the number of incoming relationships they maintain.

Table 4 also presents the descriptive statistics of the variables IWB and task conflict. On average, individuals rated themselves as innovative (M = 3.66, SD=0.621). Innovative in terms of generating ideas, promoting ideas and implementing ideas. A minimum score of 2.11 indicated that all participating individuals scored themselves as at least a little innovative. No individuals rated themselves as not innovative at all. Findings about task conflict suggested that on average, individuals experienced some task conflict in their teams (M=2.26, SD=0.68).

In Figure 2 and Figure 3 two examples of different knowledge sharing processes in teams are visualized with the aim of illustrating the social network measures. The team members are depicted by dots, the relationships between the dots are visualised by the lines between the dots. The arrows indicate the direction of the relationship and therefore the directional flow of sharing ideas about educational innovations in the network.

Team three and team five were chosen as an example because after inspecting Table 6, these teams seemed to differ the most from each other based on the mean scores on the social network measures. However, results from the independent t-test showed that only the scores of out-closeness were significantly different, $t(22) = 5.33$, p<.05, r=.11. This indicated that individuals from team three

are better able to approach each other for sharing their ideas than individuals from team six. The difference between the teams for the variables in-closeness, in-degree, IWB and task conflict were not statistically significant. In-degree: $t(22)=4.27$, p>.05, $r=.67$., in-closeness: $t(22)9.29$, p > .05, $r=.89$., IWB: $t(22)=.40$, p >.05, $r =.08$., task conflict: $t(22)= -1.25$, p >.05, $r=.26$

The significant difference on out-closeness between the teams is clearly visible in the network illustrations. Team three has a lot more lines between the team members than team six, meaning that there are more 'sharing ideas' relationships between the team members. When there are more direct relationships between team members, people from the entire network are more quickly reachable for team members to share their ideas with. Moreover, the people that are located at the side of the network in team three, still have sharing ideas relationships with a several team members, which is less visible in team six.

Table 5

Descriptive statistics on individual level

	N	M	SD	Min	Max
In-closeness	103	0.43	0.08	0.20	0.62
Out-closeness	103	0.55	0.16	0.17	1.00
In-degree	103	0.29	0.16	0.00	0.69
IWB	103	3.66	0.62	2.11	5.00
Task conflict	103	2.26	0.68	1.00	3.75

Table 6

Descriptive statistics per participating team

	Team 1 (N=44)		Team 2 (N=21)		Team 3 (N=12)		Team 5 (N=14)		Team 6 (N=12)	
	M	SD	M	SD	M	SD	M	SD	M	SD
In-closeness	0.43	0.07	0.47	0.04	0.55	0.05	0.35	0.03	.36	0.05
Out-closeness	0.47	0.12	0.65	0.15	0.73	0.16	0.59	0.11	.47	0.06
In-degree	0.19	0.13	0.37	0.12	0.51	0.15	0.31	0.12	.27	0.12
IWB	3.60	0.60	3.88	0.53	3.60	.68	3.71	0.59	3.48	0.80
Task conflict	2.10	0.65	2.16	0.57	2.33	.81	2.46	0.68	2.71	0.66

Note. the N is this Table indicates the amount of responses per team.
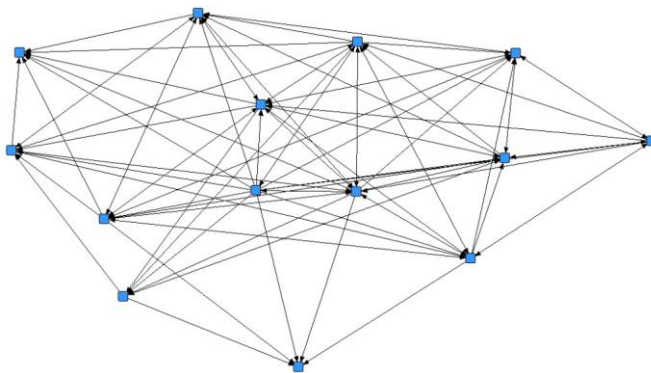

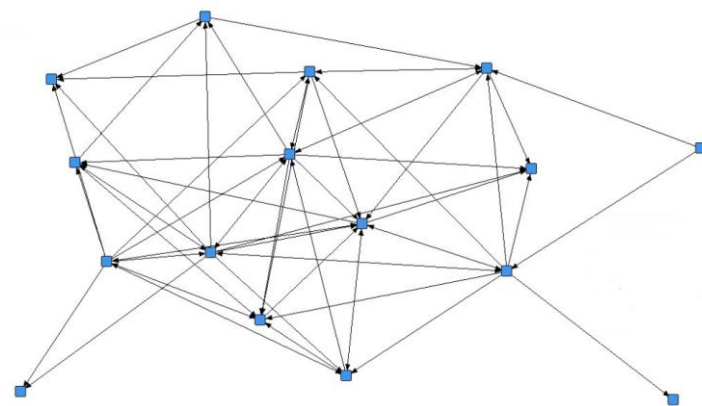*Figure 2*. The flow of sharing ideas about educational innovation within team three.

Figure 2. The flow of sharing ideas about educational innovation within team six.

Correlation analyses

The correlations measured in this study are presented in Table 7. Findings from the correlation analyses indicated that the relationships between the social network measures, in-closeness, out-closeness and in-degree, were statistically highly significant ($p < 0.001$). This means that the social network measures were highly interrelated, which is not surprising because these network measures all indicate the centrality of an actor in the network. Another significant relation existed between out-closeness and IWB, ($r = .22$, $p<.05$), which suggested that the easier it is for an individual to approach his team members for sharing his own ideas, the more IWB the individual shows. In-closeness was found to be significantly related to IWB at a lower level of significance ($r = .17$, $p<.10$).

Finally results from the correlation analyses suggested that the social network measures were unrelated to task conflict, and that task conflict was unrelated to IWB.

Hypotheses testing

Relationships between social network measures and IWB (H1+H2). Because the correlation analyses showed a significant relationship between out-closeness and IWB, a single linear regression analysis was performed to estimate the proportion of variance within IWB that can be accounted by out-closeness. Out-closeness accounted for 4.80 percent of the total variance in IWB, $R^2=.05$, $F(1,101) =5.142$, $p < .05$. This finding suggested that an individual who shares his ideas with a lot of team members and is therefore closely linked to every team member in the network, also generates, promotes and implement these ideas. In-closeness did significantly relate to IWB at a significance level of $p=.10$. Because this research maintained a significance level of $p \leq .05$, the strength of the founded relationship falls out of the margins of significance. In this study it can therefore not be concluded that a significance correlation between in-closeness and IWB was present.

Moreover, no significant relationship existed between in-degree and IWB ($r=.12$, $p>.05$), which indicated that the amount of direct incoming 'sharing ideas' relationships did not contribute to IWB.

Relationship between task conflict and IWB (H3+H4). Because of the inconsistency in literature about what level of task conflict (moderate or high) is related to IWB, two different relationships were tested. First, a possible linear relationship was tested making use of the correlations analyses. Findings showed that no significant linear relationship existed between task conflict and IWB. It is therefore suggested that experiencing more task conflict, does not contribute to IWB. Second, a possible curvilinear relationship was tested to see if a moderate degree of perceived task conflict did relate to IWB. An analysis of variance (ANOVA) showed that no significant differences existed between the groups that perceived low, moderate, or high task conflict, $F(2,100) = 1.59$, $p > .05$, $r=.12$. Therefore it was suggested that at moderate levels of perceived task conflict, no higher levels of IWB were visible, compared to at either high or low levels of perceived task conflict.

Mediating role of task conflict (H5+H6). This study expected task conflict to have a mediation role in the linear relationship between the central network position and IWB. According to Zhao, Lynch and Chen (2010) a potential mediation can only exist when a significant relationship is found between the independent variable and the dependent variable of the research. In consequence, only the potential mediating role of task conflict in the relationship between out-closeness and IWB was tested. Following the preconditions of Zhao et al. (2010) for testing the mediation of task conflict, no significant correlation has to exist between task conflict and IWB. Therefore a multiple regression analysis (Table 8) is done to test if the explained variance of IWB would grow when task conflict is added as an extra variable in the model. Results from this analysis showed that the model was not better predicted by adding task conflict, therefore it can be concluded that task conflict had no mediating role in the relationship between out-closeness centrality and IWB.

Table 7

Correlations (N= 103)

	1	2	3	4	5
1. In-closeness	1.00	.28**	.71**	.17#	-.11
2. Out-closeness		1.00	.34**	.22*	.00
3. In-degree			1.00	.12	.08
4. IWB				1.00	.01
5. Task conflict					1.00

Note: ** p≤.001, *p≤ .05, # almost significant p ≤ .10

Table 8

Multiple regression

	B	SE B	β
Step 1			
Constant	3.17	0.26	
Out-closeness	.89	0.47	0.19
Step 2			
Constant	3.11	0.32	
Out-closeness	0.88	0.47	0.19
Task conflict	0.03	0.09	0.03

Note. R^2 = .04 for Step 1, ΔR^2 = .00 for step 2 (p > 0.05).

Discussion

The role of a central network position in stimulating IWB of educational professionals

This study investigates whether educational professionals who are closely linked to their team members show more IWB, as the literature does not acknowledge whether a central position in a

knowledge-sharing network contributes to this behaviour. An important finding of this study is that educational professionals who easily share their ideas with team members are more innovative in their behaviour. Moreover, this suggests that it is valuable for the IWB of educational professionals that they are able to reach and share their ideas with the entire network. It is also advantageous for educational institutions to know that the educational professionals who actively share their ideas with others in the team are more innovative, as these educational professionals may make the most valuable contributions when implementing innovations. Therefore organisations should encourage their educational professionals to actively share ideas in their teams.

Educational professionals who are closely linked to their team members in receiving ideas do not show more IWB. This means that access to knowledge from the entire network is not as valuable for IWB as was expected. However, this relationship is present at a lower level of significance than the present study proposed. The fact that this relationship was just not strong enough to be statistically significant could be due to the small sample. A larger sample may provide a stronger relationship between in-closeness and IWB, which may lead to a positive present relationship. However, this study cannot rely on this suggestive relationship and, therefore, further research should determine whether this relationship exists or not.

Besides the finding in this study that potential access to information does not contribute to IWB, direct access to information also did not stimulate this behaviour. As such, educational professionals who have many direct incoming relationships in the knowledge-sharing network are not better equipped to convert this volume of received knowledge into new knowledge than people who have fewer direct incoming relationships. This finding could be due to the fact that being centrally located in the team can also be time consuming, as all incoming relationships need to be maintained (Mayhew & Levinger, 1976). Moreover, the volume of information that this central individual receives needs to be coordinated, which also demands time. Having direct access to a large amount of information could still be advantageous for IWB. However, because of the associated time-consuming aspect of this position, less time remains for producing IWB. Therefore, holding a central position in the team in this respect, does not lead to more IWB than holding a less central position.

Based on the findings described above, this study concludes that both a direct access and a potential access to a high volume of information do not stimulate more IWB of educational professionals. However, the dissemination of ideas in a team does contribute to IWB.

An important limitation of this study is the self-report measurement of IWB. Participants tend to over-report behaviour that is viewed as appropriate in a certain setting (Donaldson & Grant-Vallone, 2002). This bias is to be expected in this study because the research was not completely anonymous as the participants had to enter their names in the questionnaire in order to be able to map out their network. The possibility that the team manager of the participants could gain access to their scores, although assurances were given that this would not be the case, could have led to an over-rating of their IWB. De Dreu (2006) for example attempts to tackle this bias by adding the perception of the manager on the IWB of his team members. Further research can use both a self-rating measurement and a supervisor measurement, which may give a more comprehensive and accurate measurement for IWB.

Difference between incoming and outgoing relationships in social networks

The findings of this study have important implications for social network research, as they suggest that it is important to differentiate between in-coming and out-going relationships in the design of this type of study. This study showed, for example, that having a central position in easily and quickly approaching others (out-going relationships) has a different impact on the IWB of educational professionals than does having a central position in receiving knowledge from others (in-coming relationship). This shows that the direction of the relationships can produce different behaviours in organizations. Besides the importance for scientific research, this finding also contributes to educational practice because it suggests that educational professionals who have a central position in receiving knowledge may be better deployed in a different position than educational professionals who hold a central position in easily approaching others. Where the latter group of people could be primarily instrumental in implementation of educational innovations, the former could possibly contribute to other types of tasks.

Task conflict

Although some studies identify a positive relationship between a certain degree of task conflict and innovations (De Dreu, 2006; Jehn, 1995; West, 2002), this relationship is not reflected in this study. It is possible that the relationship between task conflict and IWB is not as straightforward as presented in these studies. Therefore, an attempt was made to discover other variables in the literature that explain this absence of relationship. DeChurch and Marks (2001), for example, find that task conflict only has a positive effect on team performance if the conflicts are actively management. Conflict management are the strategies that people use to reduce or solve conflicts. Similar to this study, they do not identify a direct relationship between task conflict and group performance. However, after adding conflict management as a moderating variable, a positive relationship is shown. Therefore, it would be interesting to investigate whether this could also be the case for the relationship between task conflict and IWB. Further research must view conflict management as a possible precondition to a positive relationship between task conflict and IWB, and should therefore be considered as a control variable for task conflict.

Another variable that could hinder a positive relationship between task conflict and IWB is relational conflict. This variable was not considered in this study because it does not have the potential to contribute to IWB. Studies show that this type of conflict could even counteract innovation (De Dreu, 2006; Jehn, 1997). This study possibly overlooked the interactive relationship between task conflict and relational conflict. Mooney, Holahan, and Amason (2007) identify task conflict as a mediator between different antecedents and relational conflict, and therefore conclude that task conflict triggers relational conflict. This is because task conflict can be taken personally. Therefore this work suggests that it is not possible to separate task conflict from relational conflict and this should be considered in further research.

Besides the non-existent relationship between task conflict and IWB, this study also finds no relationship between a central network position and task conflict. The network position of an educational professional is in this study based on a 'sharing ideas about educational innovations' network. However, it should be questioned whether sharing ideas on educational innovations could cause task conflict, because sharing innovative ideas is usually not part of the assigned tasks of

employees (Hellmann, 2007). Perhaps the conceptualisation of task conflict is too far removed from sharing ideas about educational innovations, which produces a non-existent relationship. Further research could propose a network that is more directly related to work tasks of the participants, for instance an advice network (for an example, see: Moolenaar, Sleegers, and Daly, 2012) or a conflict network.

Although task conflict did not mediate the relationship between a central network position and IWB, it might be interesting to examine other factors that could explain the relationship between out-closeness and IWB. Such a study could clarify why this relationship exists, so organizations may be better equipped to stimulate IWB. Research consistently confirms the importance of trust in a team for innovation (for example: Dovey, 2009; Murphy, 2002; Nielsen & Nielsen, 2009). Trust encourages individuals to share their information and resources with each other (Murphy, 2002) and it stimulates the willingness for risk taking behaviour, which is essential for innovation (Mayer, Davis, & Schoorman, 1995). Trust develops through shared experiences and relations (Murphy, 2002) which highlights the importance of social interactions within the team. Therefore, it could be interesting for further research whether trust has a mediating role in the relationship between social networks and IWB.

Overall conclusion

The present study made an important contribution to the educational practices. It created awareness that educational institutions should stimulate knowledge sharing within their teams, as this can be a valuable contribution to the implementation of educational improvements. Further research should continue exploring factors that predict IWB, so that this behaviour can be better stimulated in order to meet the demands from the 21ste century in education.

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Appendix A

Table 9

Items of the Dutch questionnaire of innovative work behaviour

	Innovatief gedrag
1	Ik bedenk nieuwe ideeën voor moeilijke problemen
2	Ik ga op zoek naar nieuwe manieren of instrumenten voor mijn werk om tot vernieuwing te komen
3	Ik ontwikkel originele oplossingen voor problemen.
4	Ik creëer draagvlak voor innovatieve ideeën.
5	Ik probeer steun te krijgen wanneer ik iets nieuws bedenk.
6	Ik maak leidinggevenden van de organisatie enthousiast voor innovatieve ideeën.
7	Ik vertaal innovatieve ideeën naar bruikbare toepassingenideeën.
8	Ik werk systematisch aan het introduceren van innovatieve ideeën.
9	Ik ga na in hoeverre innovatieve ideeën waardevol zijn geweest.

Table 10

Items of the Dutch questionnaire of task conflict

	Taak conflict
1	U heeft verschil van mening over het werk wat gedaan wordt binnen uw team
2	U heeft conflicten over ideeën in uw team.
3	U heeft conflicten over het werk wat u doet.
4	U heeft verschil in mening in uw team.