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Master thesis

Educational Design and Consultancy

‘Sharing ideas for innovative work behaviour to thrive’

Research into individuals’ position in a social network in relationship to innovative work behaviour, and the mediating role of perceived psychological safety.

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Abstract

Within the educational field practitioners are facing an array of challenges, such as governmental and societies' higher expectations of education and new scientific educational insights. In order to adapt to these challenges, innovative instructional strategies, processes, and structures have to be formulated. Individual work behaviour is one of the most important aspects for innovation to arise. In addition, many studies have argued that innovation derives from informal social networks. There is still no consensus in current literature about factors that modify the relationship between social networks position and innovative work behaviour. Therefore, this research examined the influence of psychological safety.

Data was collected from 143 participants from two educational organizations in The Netherlands, that are concerned with innovation within primary schools and Higher Vocational Education. A quantitative questionnaire using Likert-type scales and a social network question on sharing innovative ideas was analysed, using social network analysis, correlation, and regression analyses.

Findings showed that when individuals occupy a central position, they shared more ideas, and subsequently perceived their work behaviour as innovative. Findings did not revealed a mediating effect of psychological safety between this relationship.

This research illustrated the usefulness of accounting for network positions for better understanding innovative behaviour, what leads to innovation.

Keywords: Social networks, innovative work behaviour, psychological safety

Introduction

Within the educational field, practitioners are facing an array of challenges. They have to be able to cope with increasing reforms, such as new educational technologies, the cultural diversity in schools, and new scientific educational insights (Vodegel, Smid, & Van den Bosch, 2011). Furthermore, they also need to meet to the government's and societies' higher expectations of education (Thurlings, Evers, & Vermeulen, 2014). In order to adapt to all these changes, organizations within the educational field have to acknowledge that innovation is vital to survive. It is necessary to formulate new and innovative instructional strategies, processes, and structures (Daly & Finnigan, 2011; Moolenaar, Daly, & Sleegers, 2010).

Organizational and educational research found that individual behaviour is one of the most important aspects for innovation to arise (Fullan, 2002; Janssen, 2000; Messmann & Mulder, 2012). Because it is the individual who develops ideas, reacts to ideas of others, and shapes ideas to specific work contexts (Janssen, 2000; Van de Ven, 1986). Therefore, this research focussed on individual innovative work behaviour (IWB). Within this research, IWB is defined as generating, sharing, and implementing innovative ideas (Janssen, 2000).

In addition, many studies have argued that organizational success and innovation arises from informal social networks (Balkundi & Kilduff, 2006; Moolenaar, Sleegers, & Daly, 2012; Nahapiet & Ghoshal, 1998; Ruef, 2002; Tsai, 2001). Regarding education, social networks can improve the quality of instruction and student learning outcomes (Wood, 2007).

The reason for this organizational success is due to the strong impact social networks have on the ability for individuals to learn (Argote, McEvily, & Reagans, 2003). Learning is a key determinant for innovation (Tidd, Pavitt, & Bessant, 2001; Verdonschot, 2009). The process of creation can be considered as the underlying learning process. This is the process of solving difficult questions and problems, developing innovative concepts and ideas, and interacting with others which results in improvements or innovations (Paavola & Hakkareinen, 2005; Tsai, 2001; Verdonschot, 2009).

The connections, the positions, and the diffusion of innovative ideas, form the social context of network structures (Kolleck, 2013). By using social network analyses, the social context and the network structure are captured. This research acknowledged the importance of understanding how

individuals' social network positions influence IWB. Research suggested that one's opportunity to access new knowledge, which is essential to develop innovative ideas, is dependent of one's network positions (Tsai, 2001). However, in empirical research there is an ongoing debate about which network positions enhance innovation (Daly, 2012). This debate reflects two specific network positions, a more central and a more peripheral position.

Due to this contradiction, it is still interesting to assess whether more central or peripheral network positions enhance IWB. It also becomes increasingly important to know more about other social factors that matter in social networks, which enables IWB (Verdonschot, 2009; Perry-Smith, 2006; Scott & Bruce, 1994). Moreover, because there is no consensus in current literature about factors that modify the relationship between individuals' social networks position and innovation. (Yuan & Woodman, 2010; Zheng, 2010). Therefore, this research suggested that perceived psychological safety (PS) can be a possible mediator between this relationship. Due to the fact that individuals will show more initiative for new ideas and to generate and implement them when they have the feeling that the team is safe enough (Bear & Frese, 2003).

Regarding to daily practice, this research may also have an important contribution. Despite the academic knowledge that social networks enhance learning and innovation, organizations rarely support social networks (Mohrman, Tenkasi, & Mohrman 2003). This research aims to raise awareness so that educational organizations will acknowledge the fact that educational innovation arises from the organization's most valuable resources, the individuals.

To investigate important factors that may enhance IWB, and therefore educational innovation, this research is guided by the following research question: *What is the relationship between individuals' position in an idea sharing social network and individual IWB, regarding to educational renewals? And what is the extent of perceived PS as mediating role?*

To answer these questions, this study will present the results of the research into social networks, IWB, and PS in two Dutch educational organizations that are concerned with educational innovation. The next section consists of a review of literature of social networks, IWB and PS. Furthermore, this research elaborates on the relationships between those concepts. To conclude,

conclusions and implications are described.

Theoretical framework

Individual innovative work behaviour

The educational work context is characterized by a high knowledge intensity and a dynamic content (Messmann & Mulder, 2014). As mentioned earlier, the educational field is facing many challenges, such as societies' higher expectations of education and new scientific educational insights. In order to adapt to these continuous challenges, innovation is vital (Janssen, 2000).

One of the most powerful lessons for innovation involves individuals. Organizational innovation is driven by individual employees (Carmeli, Meitar, & Weisberg, 2006; De Jong & Den Hartog, 2010; Thurlings et al., 2014). Therefore, this study focused on the individual level of innovation. IWB is one of the most important elements of innovation at the level of the individual (De Jong, 2006; Janssen, 2000; Getz and Robinson, 2003; Van de Ven, 1986). Regarding education, educational practitioners are responsible to bring innovation into instructional strategies, processes, and structures (Daly & Finnigan, 2011).

Drawing on Janssen's work on IWB, this research identifies IWB as the generation, promotion, and realization of ideas (Janssen, 2000). Individuals develop ideas, react to other ideas, and shape ideas to their specific work contexts (Janssen, 2000; Van de Ven, 1986). To begin, individuals show IWB when they generate ideas, which encompass the production of unique and useful ideas. When an individual has generated an idea, the idea has to be promoted to potential partners who also can support and promote the idea. The final aspect of IWB is the realization of ideas. Idea realization can be achieved by testing a certain model in practice. Once this is a success, the innovation can be applied within the team or organization (Janssen, 2000).

Ideas differ from additional innovations to radical changes in processes, practices, and paradigms (Argyris & Schön, 1978; Janssen, De Vries, & Cozijnsen, 1998; Kanter, 2000). Ideas can be seen as innovative whenever the ideas are new to the involved employees (Van de Ven, 1986).

In the next two sections, the individual positions in social networks and the psychological process, that are suggested to contribute to IWB, are described.

Social networks

To understand the role of an individual's position in a social network and the relationship with IWB, it is crucial to describe the relationship between social networks and learning. As mentioned in the introduction, a large amount of learning takes place in social networks (Argote et al., 2003). In these social networks individuals are connected with each other. They share experiences and viewpoints, take part in discussions, and develop and distribute knowledge together (Carmeli, 2007; Earl & Katz, 2007; Wenger, Trayner, & De Laat, 2011). By continuous interaction with others, individuals create new forms of meaning, understanding, ideas, and knowledge (Hubbart, Mehan, & Stein, 2006; Nonaka, 1994). Therefore, these interactions, underlying learning aspects, and relationships are best examined by social networks (Kolleck, 2013). In addition, visible measures of idea sharing can be critical for increasing the awareness of its power and for encouraging organizations to address or support collaboration in social networks to emphasize IWB and thereby learning and innovation.

Individuals' position in social networks in relationship to innovative work behaviour.

Drawing on the statements above, learning is a collaborative matter. This collaborative aspect also counts for IWB. In order for an effective realization of innovative ideas, an individual has to share and promote these ideas with team members. A social network perspective can help to understand how innovative ideas are being diffused and shared within a social network. Moreover, it also can help to understand how an individual's position is linked with IWB.

This research assessed the individual position in social network in terms of ego centrality and ego reciprocity. Centrality is considered as one of the key principles of a social network. Centrality refers to the position of an individual in the network and accumulates the potential access to resources and information (Daly & Finnigan, 2010; Wasserman & Faust, 1998). It illustrates the relative number of connections that an individual has to other members in the network (Moolenaar et al., 2012). The more connections an individual has with other members, the more central the position.

As described earlier, there is an ongoing debate which central position enhance innovation and therefore IWB. Scholars have claimed that individuals who have a less central position in a network, a more peripheral, generate more ideas and are more innovative (Christensen, Johnson, & Horn, 2008;

Daly, 2012; Granovetter, 1973; Perry-Smith & Shalley, 2003; Rost, 2011). This is suggested due to the fact that those individuals have connections with others who hold different perspectives, who have different interests, and who have different manners to approach problems (Ibarra, 1992; Lin, Ensel, & Vaughn, 1981; Lincoln & Miller, 1979; Rost, 2011). Individuals can combine their own perspectives with these new perspectives, which often lead to innovative solutions (Cross & Parker, 2004).

Contrasting, other researchers have found evidence that the higher an individual's centrality, the more access to high quality of information, knowledge, and resources one has (Ahuja, Galeta, & Carley, 2003; Daly, 2012). Consequently, one can easier solve problems, develop solutions, and generate ideas (Burt, 2000; Brass, 1984; Hansen, 1999; Ibarra, 1993; Reagans & McEvily, 2003; Moolenaar et al., 2012; Uzzi, 1997).

Centrality in this study is assessed by one measure of centrality; closeness. Closeness is conceptualized as how close an individual is to other team members (Moolenaar et al., 2012). Individuals who are close to others in the network, have short paths to others, and will receive and provide information sooner (Borgatti, 2005; Freeman, 1979). Concluding, central individuals can easily create new connections (Stuart, 1998) and have more opportunities to turn the new information, knowledge, and resources into new combinations (De Jong & Wennekers, 2008; Tsai, 2000). Moreover, central individuals are being more approached by others for knowledge and have easier access to knowledge from others (Adler & Kwon, 2002; Moolenaar et al., 2012). Therefore, in terms of IWB, the higher an individuals' closeness the quicker their innovative ideas reach others and also the quicker they receive ideas from others.

Drawing on these statements and findings, hypothesized was that *a higher level of individual centrality in a social network, assessed by closeness, positively influences individual IWB (H1).*

Another aspect to assess the individuals' central position and the structure of relationships in social networks is to provide attention to ego reciprocity. Ego reciprocity refers to mutuality of relationships between individuals and other members (Daly, 2012). In terms of IWB and idea sharing, relationships are reciprocal when someone is giving as many ideas to other as one is receiving ideas from others (Tilburg, Van Sonderen, & Ormel, 1991; Rao & Bandyopadhyay, 1987).

Ego reciprocity was examined in this study because it is closely related to social support (Tilburg et al., 1991). In order for ideas to be innovative and successful, individuals have to receive support from others (Janssen, 2005; Kanter, 1988). Other academic evidence is also found between the relationship on frequent and mutual interactions and innovation (Moran, 2005; Reagans & Zuckerman, 2001; Rost, 2011; Smith, Collins, & Clark, 2005). Firstly, research suggested that reciprocal ties are more exposed to information flows (Granovetter, 1973). Due to the fact that when individuals have reciprocal ties, they expect that their efforts of sharing will be reciprocated, thereby they ensure ongoing sharing of knowledge (Hung, Durcikova, Lai, & Lin, 2011; Wasko & Faraj, 2005). Secondly, mutual ties stimulate the exchange of more complex knowledge and information (Capaldo, 2007; Hansen, 1992; Tsai & Ghoshal, 1998). Above all, reciprocal ties will quicker absorb new ideas from each other (Reagans & McEvily, 2003). Consequently, based on the findings that reciprocal relationships between members stimulate the absorption of new ideas and knowledge sharing, it is plausible to suggest that mutual relationships enhance IWB, as IWB reflects the generating and promotion of ideas. Therefore, this study hypothesised that *a higher level of individual centrality in a social network, assessed by ego reciprocity, positively influences IWB (H2).*

Psychological safety

As considered in the first two hypotheses individuals' position in social networks influence IWB. In addition, this research argued another specific aspect of the social context that influences IWB, namely PS. PS consists of concepts as seeking feedback, asking questions, and taking risks (Edmondson, 1999). Based on this definition, researchers suggested a positive relation between PS and learning (Baer & Frese, 2003; Carmeli, 2007, Carmeli & Gitell, 2009; May, Gilson, & Harter, 2004). "To learn, employees cannot fear being belittled or negatively being criticized when they disagree with peers or authority figures, ask naïve questions, own up to mistakes, or present a minority viewpoint" (Garvin, Edmondson, & Gino, 2008, p.4).

While previous studies examined PS at the team level (e.g. Edmondson, 1999; Detert & Burris, 2007), this study investigated individuals' psychologically safety in the team in which they participate. PS refers to the individual perception about the consequences of individual actions

(Carmeli & Gittell, 2009). Individual perceptions of PS are the basis of team PS. Without the former, the latter cannot exist. Team structures and cultures arises from these individual behaviours and perceptions (Schulte, Cohen & Klein, 2012). For example, when individuals want to report a mistake and have the feeling that they can openly report that mistake, without there being negative consequences, then, in all probability, the team culture can be defined as one where admitting mistakes is being supported and tolerated, and where team members learn from failures at work.

Drawing on these findings, this paper used the definition that individual PS is perceived in a work environment when individuals can ask questions and feedback, take risks, and speak out without negative consequences (Baer & Frese, 2003). More importantly regarding IWB, it is the perception of someone to safely share new ideas with other members of the team.

Consequently, when individuals feel psychologically safe in a team, they are more likely to express themselves and come up with innovative ideas (Kahn, 1990). Previous studies have demonstrated a relationship between PS and innovative behaviour and personal engagement in innovative work tasks (Vinarski-Peretz & Carmeli, 2011). Based on these findings, hypothesised is that *perceived PS positively influences individual IWB (H3).*

Mediating role of perceived psychological safety, in the relation of individuals' social network position and individual innovative work behaviour

Suggested in this research is that the relationship between individuals' social network position and IWB is mediated by perceived PS. From IWB perspectives it is argued that in order for individuals to express their thought about innovative ideas, they must feel comfortable and safe (Janssen, 2005; Kanter, 1988). When a person holds a central position in the network and has reciprocal relationships, he or she will perceive more PS (Adler& Kwon, 2002; Balkundi & Harrison, 2006; Schulte et al., 2012). The larger amount of (mutual) relationships will give individuals the belief that they are being stimulated and supported. This makes them feel safer and consequently they can express themselves more easily than individuals with a less central position do (Balkundi & Harrison, 2006; Kahn, 2007). In fact, central individuals have no fear failing or that their ideas will be rejected (May et al., 2004; Lee & Kim, 2010). When people feel safe, they feel not constrained to say what they think, and

therefore not feel criticized. Subsequently, they are likely to take risks and suggest new ideas (Carmeli & Gittell, 2009; Hammond, Neff, Farr, Schwall, & Zhao, 2011).

Based on the findings above it can be expected that *individuals' position in social networks, assessed by individual centrality, enables individual IWB through the influence of perceived PS (H4).*

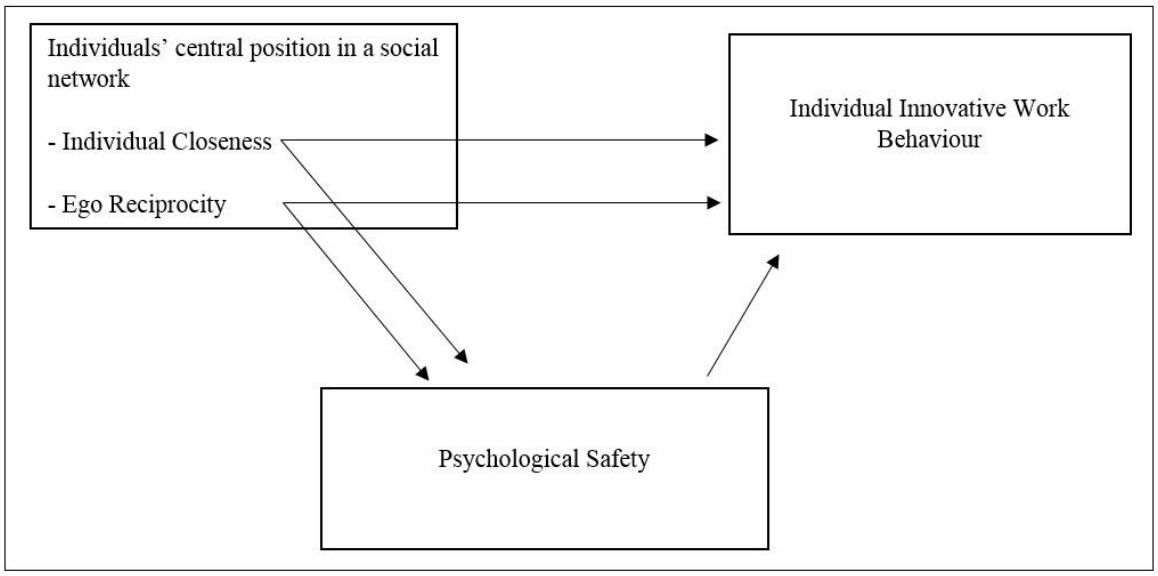

Figure 1. Conceptual framework

Method

Research design

This study used an explorative research methodology. Social network analysis and quantitative survey methods were applied to examine the research question and hypotheses. The social network analysis was used as a systematic approach to quantify and visualize the overall structure, the relationships between team members, and the individual positions in social networks. The quantitative survey method was used in two ways. Firstly, to assess individual perceptions of IWB. Secondly, to assess individual perceptions of PS.

Context

With the aim of testing the research question and hypotheses, an empirical study was carried out in two Dutch organizations. Both organizations are engaged in the educational field. The first organization is an educational consultancy company, which give advice for primary schools and child centres. This organization is involved with external innovation for their clients, meaning that they strive for sustainable educational improvements and all the activities carried out by the consultants are in line with the latest research in the educational field. The second organization was a College for Higher Vocational Education (Dutch abbreviation: HBO). Data was collected in one specific degree program. This degree program is involved with internal innovation, as they currently undergoing a process of renewal for their entire curricula. These two organizations were selected as they both are involved with improving education and student learning outcomes. Although the focus of orientation (external and internal orientation of innovation) varies, both organizations are reforming existing structures, processes, and instructional strategies.

Sample

Data was collected from 126 members (N = 126) and reflected a total response rate of 86%. All data were collected in March and April 2015. Of the participants, 25% were male (N = 32) and 75% female. In total, data was collected from six teams, three teams of the educational consultancy company and three teams of the College for Higher Educational Education. Team size varied between 14 and 45, with an average of 29 employees per team. The average response rate of teams was 76.8 %.

Table 1 presents team sizes and response rates. Additional sample demographics of participants of both organizations are presented in Table 2.

Table 1

Response rate per team of both organizations

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

Note: * Due to the low response rate and therefore low reliability of the network measures of the social network analysis, team 6 was not taken into account into further sample characteristics, sample data, and data analyses.

Table 2

Sample characteristics of respondents (*N* = 103)

	N	*M*	*SD*	*Min.*	*Max.*
Age	103	42.01	10.53	26	64
Years of experience in the organization	103	9.49	6.60	1	30
Years of experience in the team	103	8.36	6.19	1	30

Procedure

In consultation with the organizations, teams were selected. The selection was based on convenience sampling. In both organizations, team managers gave prior consent to data collection and informed their employees about the general topic of the research via a message in the weekly online newsletter.

All participants received a first invitation of the online survey by email with a link to the survey. The questionnaire consisted of five demographic questions, one network question, and 14 statements of IWB and PS with Likert scale responses. The survey took on average five to 10 minutes to complete.

The participants were also informed that the research was completely anonymous, meaning that results were presented to the organization without names of participants. Also, all participants were told to answer the questions related to their experiences in their current team composition.

The survey was sent to 146 employees in total. To strive for a response rate of 80 to 100%, respondents who did not respond a week after the first email received a reminder via email. Respondents who did not respond one week after the first reminder received another reminder and an email from their team managers with the request to fill in the survey.

Pilot study

Both scales were originally written in English. Therefore, both of the questionnaires were first translated from English to Dutch and then back-translated. These were then compared to the original English versions and adjustments were made in the Dutch translations where necessary (See Appendix A for the Dutch questionnaires). To protect the face validity of the adapted and translated surveys, a pilot study was conducted by fifteen non-participating individuals who were working in the educational field. Each item of the survey was checked whether it reflected the construct. The participants were asked to fill in the questionnaire and comment on items that could be ambiguously. One item of the Team Psychological Safety scale, ‘In this team it is completely safe to take a risk’, was found to poorly contribute to the scale and was therefore removed. Besides this one item, the pilot study supported the validity of the questionnaire items and resulted in the final questions to assess IWB and PS.

Instruments

Individual’s social network position. The independent variable, individuals’ social network position, was examined using social network analysis. A social network question was used regarding relationships with members of the team to gain insight into the patterns of social interactions in the

sample organizations. Respondents were asked to name people in the organizations with regards to the following question: *'With whom you share your ideas concerning educational innovations?'*

Based on previous studies on IWB (Janssen, 2000; Deichmann, 2012), this study focussed on the network structure around sharing and distributing ideas. To emphasize on sharing ideas was chosen due to various reasons. First of all, and most importantly, regarding this research, sharing ideas is seen as an important element of innovation and IWB (Jantunen, 2005; Keller, 2001; McAdam & McClelland, 2002; Mumford, 2000). The exchange of ideas will enhance opportunities for adequate and sustainable educational change and improvement (Messmann & Mulder, 2012) Secondly, sharing ideas is part of professional learning (Elmore, 2000; Fullan, 2009). Thirdly, in order for novel ideas to be valuable for innovation, ideas need to be shared and combined with insights from others. Ultimately, sharing ideas is also chosen as network question due its relationship with PS. PS can be seen as a condition for sharing ideas. When individuals perceive the team as psychologically safe, they will not be concerned about possible negative reactions from others when they share innovative ideas (Cannon & Edmondson, 2001; Edmondson, 2004; Gilson & Shalley, 2004; Kark & Carmeli, 2009).

Some researchers criticized asking a single question (e.g. Ibarra, 1993; Rogers & Kincaid, 1981). They suggested that one question is similar to measure a construct with a single item scale However, other researchers stated that when asking a single question, reliability is enhanced when individuals are assisted in recalling and reporting their network relationship accurately (Ibarra, 1993; Marsden, 1990). To promote reliability, the social network survey was conducted by an online form where participants were provided with a closed- list of all the employees of their team in alphabetical order. Additionally, participants were not restricted to choose a maximum of team member, which whom they share ideas. This approach was chosen, because of the possibility to picture all possible flows of innovative ideas, and therefore to provide the full range of individuals' connections.

Innovative work behaviour. In order to assess the dependent variable, individual IWB, items of Janssen's (2000) innovation behaviour scale were used. These items were based upon Scott and Bruce's (1994) scale for individual IWB in the workplace. The scale designed by Janssen (2000) represented nine items and measured the extent of individual idea generation, promotion, and implementation (Janssen, 2000).

Janssen (2000) found that self-reports present a profound representation of an individual's own contextual and intentional activities regarding to innovative ideas.

This instrument used a 5-point Likert scale, with answer options ranging from 1 = strongly disagree to 5 = strongly agree. Principal factor analysis provided evidence that the nine items contributed to a single factor solution, explaining 53% of the variance, with individual factor loadings from .66 to .81. This scale had a high internal consistency, with a Cronbach's reliability of a = .89. The items of this scale are presented in Table 3.

Table 3

The Innovative Work Behaviour scale

IWB (α = .89)	**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 transform innovative ideas into useful applications.	.72
5. I search out new working methods, techniques, or instruments.	.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 for innovative ideas.	.67
9. I generate original solutions for problems.	.66

Psychological safety. To assess the mediating role of PS, perceptions of team PS were measured based on items of 'The Team Psychological Safety Scale' developed by Edmondson (1999). Although individual responses were the basis for analysing this construct, the participants were asked to evaluate the PS at team level. Due to the fact PS is originally a team construct. To maintain the individual conceptualization of the assessed construct, the team's PS was analysed as the perception of the individual team members that the team is safe to speak openly. The scale consisted of five statements and was scored on a 5-point Likert scale, with the anchors ranging from 1 = strongly disagree to 5 = strongly agree.

Principal factor analysis provided evidence that the 5 items contributed to a single factor solution, explaining 49% of the variance, with individual factor loading from .57 to .79, and with sufficient scale reliability (Cronbach's α = .72). The items of this scale are presented in Table 4.

Table 4

The Team Psychological Safety scale

PS (α = .72)	**I**
1. When someone makes a mistake in this team, it is often held against him or her.	.79
2. It is difficult to ask other members of this team for help.	.75
3. In this team, people are sometimes rejected for being different.	.71
4. Members of this team value and respect each other's contributions.	.64
5. In this team it is easy to discuss difficult issues and problems.	.57

Data analysis

Social networks. To better understand the structure of the network, different social network measures were conducted using UCINET 6.0 (Borgatti, Everett, & Freeman, 2002). The following paragraphs discuss these network characteristics more specifically.

This study focused on individuals' central position in social networks. Network centrality gives information about the relative centrality of an individual to the other actors in the network. When actors in networks are central, they have more access to information and resources what will enhance IWB (Stuart 1998; Tsai 2000).

In this research centrality was measured by closeness centrality. Closeness centrality is calculated as the total distance of an actor from all other actors in the social network. It is interpreted as how long it will take for the individual to reach all of the other members in the network (Moolenaar, et al., 2010). Closeness can be measured by in and out closeness. In closeness refers to the degree an individual can be reached by all the other individuals in the network (Borgatti et al., 2002). This means in terms of IWB that an increase in closeness signifies that individuals are more sought by others to discuss ideas. Out closeness is based on individuals' outward connections. This means that a high out

closeness for an actor means that he or she can quickly interact and share ideas and information with other members of the network due to the small numbers of paths to others (Adler & Kwon, 2002; Moolenaar et al., 2012; Otte & Rousseau, 2002). The quicker individuals can share their ideas, the more individuals show IWB (Janssen, 2000). Closeness centrality measures range from 0 (individual is not central), to 1 (individual is central).

The other measurement this study used to examine individuals' position in social networks was ego reciprocity. Ego reciprocity is a measure of reciprocity at individual level. Reciprocity refers to the percentage of relationships an individual gets back. Ego reciprocity was chosen as a measure because it is suggested to be related to IWB (e.g. Reagans & Zuckerman, 2001; Rost, 2011).

In this study direct reciprocity was measured, which refers to determining whether mutual relationships occur between pairs. This suggests that if A shares ideas with B, then B shares ideas with A. Ego reciprocity ranges from 0 (none of the relationships of an individual are bidirectional) to 1 (all the relationships of an individual are bidirectional) (Garlaschelli & Loffredo, 2004). In this research a high level of ego reciprocity reflects a mutual exchange of innovative ideas about educational renewal.

Innovative work behaviour and psychological safety. To calculate descriptive statistics, correlational, and regression analyses to examine the relationships between individuals' social network positions, IWB, and PS, SPSS 21.0 was used

Analyses strategy

The first step of the analyses was the investigation of the effect of outliers. Outliers were defined as individuals who scored two standard deviations from the mean. The removal of these outliers showed no difference in correlations. Therefore, outliers were not removed. The second step of the data analyses consisted of executing different analyses on the data to prove that different assumptions were met. Histograms with a normal curve were used to investigate the assumption of normality. According to the output, all variables were within the acceptable range of a normal distribution. Furthermore, tolerance statistic to test for multicollinearity were computed. All scores had tolerances > .1 and VIF scores < 10, therefore there was no evidence of multicollinearity.
With a regression analysis the assumption of linearity was estimated. Subsequently, descriptive statistics were measured. Thirdly, an independent t-test was conducted to compare different means

between teams. The fourth step was to examine the correlations of all the variables with Pearson's correlation coefficients. Subsequently, an one-way regression analysis was conducted to assess the strength of the significant relationship. Ultimately, a multiple regression analysis was conducted to check whether PS had a mediating effect in the relationship between individuals' position in a social network on IWB.

Results

Descriptive Analyses

Descriptive statistics for IWB, individuals' social network position, and PS were calculated (see Table 5). Findings suggested that, on average, respondents feel that they are showing innovative work behaviour (M = 3.66, SD = 0.62). Scores on IWB ranged from a neutral to a confirmative score. In general, respondents agreed on questions such as 'I generate original solutions for problems'. Findings also indicated that, in general, respondents feel that the team is psychologically safe (M = 3.88, SD = 0.58). On average, respondents agreed on questions such as 'In this team it is easy to discuss difficult issues and problems'.

Descriptive statistics indicated that individuals in the research sample shared their innovative ideas about educational renewal in general with roughly the half of their colleagues (average out closeness is 55%). Approximately, individuals in the sample received innovative ideas about educational renewal from a little less than the half of their colleagues (average in closeness is 43%). Furthermore, descriptive findings showed that roughly about a third of all relationships, in which individuals involve regarding to sharing innovative ideas, is reciprocated (average degree of ego reciprocity is 32%). This means that of all the possible relationships that could exist around sharing ideas, almost a third of these relationships are actually confirmed to exist by the individuals. To give an outline of the data set, network data of each participating team is presented in Table 6.

Table 5

Descriptive statistics for Individuals' position in social networks, PS, and IWB (N=103)

	N	Min.	Max.	*M*	SD
Centrality					
Closeness Out	103	0.17	1.00	0.55	0.16
Closeness In	103	0.20	0.62	0.43	0.08
Reciprocity	103	0.00	0.67	0.32	0.16
IWB	103	2.11	5.00	3.66	0.62
PS	103	2.43	5.00	3.88	0.58

Table 6

Descriptive statistics for Individuals' position in social networks, PS, and IWB of all teams

	Team 1 (*N* = 44)		Team 2 (*N* = 21)		Team 3 (*N* = 12)		Team 4 (*N* = 12)		Team 5 (*N* = 14)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Centrality										
Out	0.47	0.12	0.65	0.15	0.73	0.16	0.47	0.15	0.59	0.11
Closeness										
In	0.43	0.07	0.47	0.04	0.55	0.04	0.36	0.04	0.35	0.03
Closeness										
Reciprocity	0.31	0.18	0.38	0.13	0.41	0.13	0.27	0.13	0.25	0.12
IWB	3.60	0.60	3.88	0.53	3.60	0.53	3.38	0.53	3.71	0.59
PS	4.15	0.47	3.83	0.54	3.95	0.54	3.48	0.54	3.45	0.13

According to the descriptive statistics (see Table 7), some teams did seem to differ in scores. At first sight, the scores on out closeness seemed to differ the most between the teams. It was interesting to further analyse the possible differences on out closeness centrality, due to the importance of out closeness regarding sharing innovative ideas. Therefore, an independent-samples t-test was

conducted on two teams which seemed to differ the most according their scores on out closeness. Team 3 scored relatively high on out closeness (M = 0.73, SD = 0.02)[1]. Contradictory, team 4 scored relative low on out closeness (M = 0.47, SD = 0.15)[2]. The independent-samples t-test did show significant differences in results between the teams on out closeness, $t(22) = 5.33$, $p < .05$, $r = .11$. There has not been found differences between the other variables[3].

The results of this network data of these two teams can also be illustrated. Figure 2 and 3 provide social network visualizations of the two sample teams. Figure 2 represents team 3, which scored relatively high on out closeness centrality. Figure 3 provides a visualization of team 4, which scored relatively low on out closeness centrality.

In these social network visualizations, individuals are represented by squares. Relationships between individuals are visualized by arrowed lines, representing the directional flow of the shared innovative ideas about educational renewal. The networks are plotted so that individuals with relatively more relationships are centred and individuals that maintain fewer relationships are at the periphery. Therefore, this visualizations shows that in team 3, individuals are closer to each other, due to more outward flows of innovative ideas and less individuals at the periphery.

[1] Correspondently, team 3 scored relatively high on in closeness (M = 0.55; SD = 0.05), ego reciprocity (M = 0.41, SD = 0.13), IWB (M = 3.60, SD = 0.53), and on PS (M = 3.95, SD = 0.54).
[2] Correspondently, team 4 scored relatively low on in closeness (M = 0.36, SD = 0.04), ego reciprocity (M = 0.27, SD = 0.13), IWB (M = 3.38, SD = 0.53), and on PS (M = 3.48, SD = 0.54).
[3] Findings did not revealed significant differences between teams on in closeness $t(22) = 9.29$, $p > .05$, $r = .89$, ego reciprocity $t(22) = 2.11$, $p > .05$, $r = .49$, IWB $t(22) = .40$, $p > .05$, $r = .08$, and PS $t(22) = 1.71$, $p > .05$, $r = .34$.

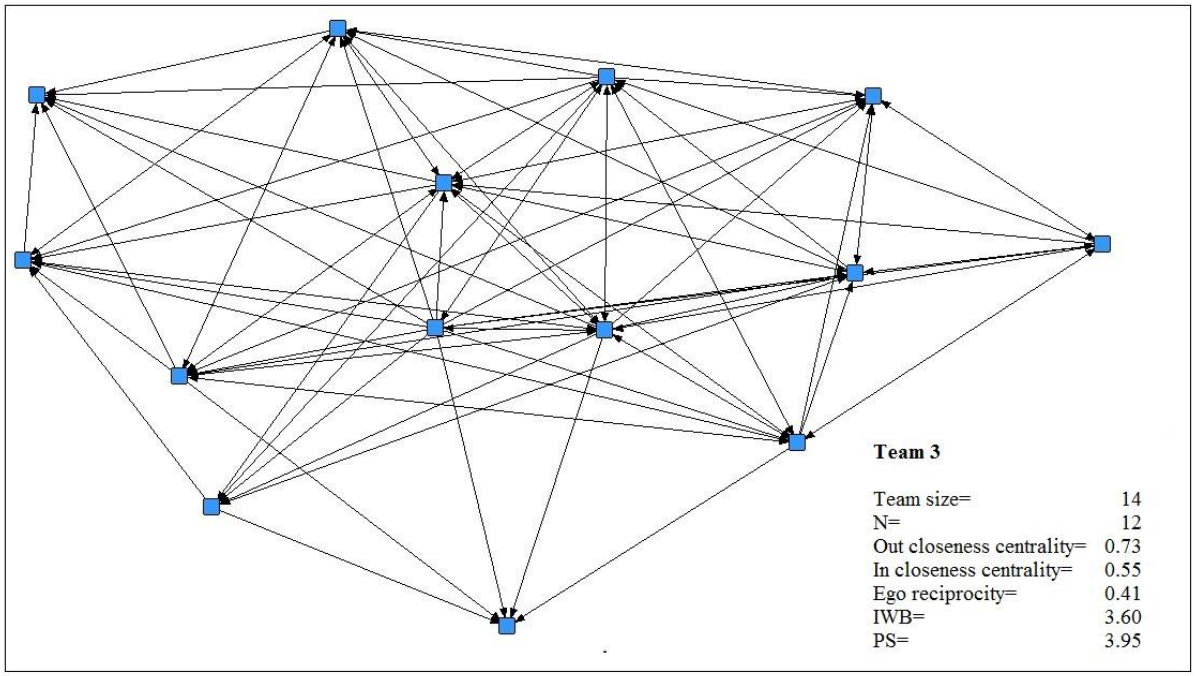

Figure 2. Representation of team 3, which scored high on outcloseness centrality.

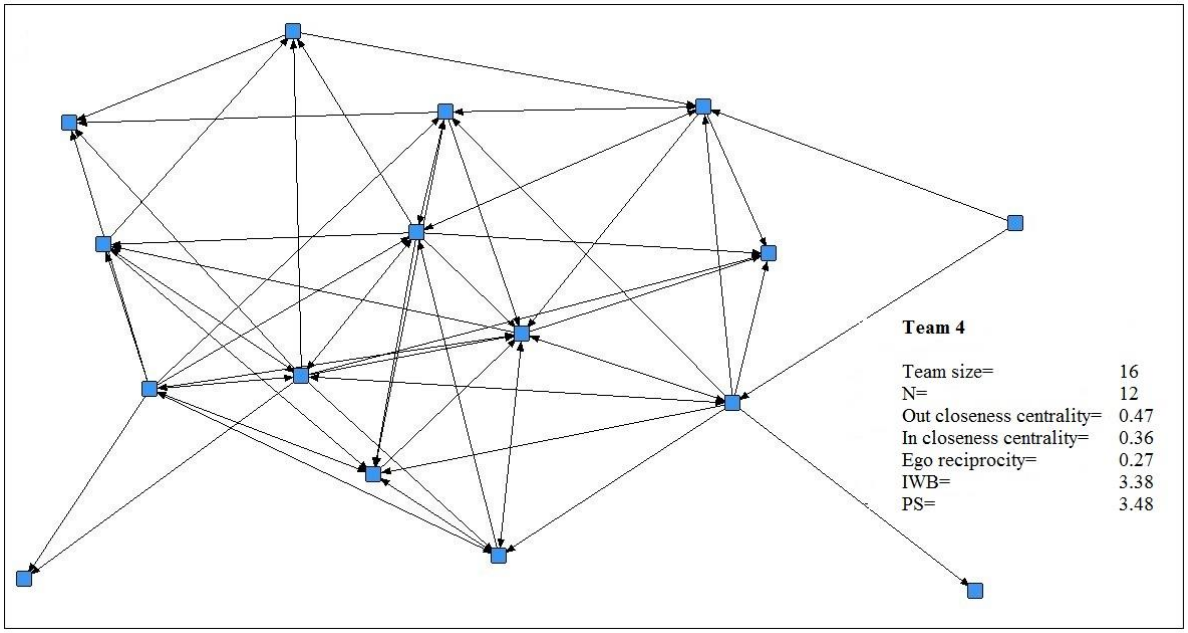

Figure 3. Representation of team 4, which scored low on outcloseness centrality.

Preliminary Analysis

To assess the size and direction of the linear relationship between all variables, Pearson's correlation coefficient was used. The correlations of all variables are shown in Table 7. Individuals' central position, as assessed by out closeness, was correlated with in closeness (r = .28, p < .05). Out closeness was also correlated with ego reciprocity (r = .27, p < .05). However, not all centrality measures correlated with each other. In closeness did not correlate with ego

reciprocity. Furthermore, out closeness was correlated to IWB ($r = .22$, $p < .05$). The other centrality measures, in closeness and ego reciprocity were not correlated with IWB. Of all centrality measures, only in closeness correlated with PS ($r = .245$, $p < .05$). The final correlation showed that PS was not correlated with IWB.

Table 7

Correlations for all variables (N =103)

	1a	1b	1c	2	3
1.Individuals' central positions in social network					
a. Out Closeness	1.00	.282**	.274**	.220*	.000
b. In Closeness	.282**	1.00	.583	.169#	.245**
c. Ego Reciprocity	.274**	.583	1.00	.193#	.104
2. IWB	.220*	.169#	.193#	1.00	.085
3. PS	.000	.245**	.104	.085	1.00

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

Tests of hypotheses

Hypothesis 1 predicted a positive relationship between individuals' position in a social network, assessed by closeness, and IWB. Results from the correlation analysis (see Table 6) suggested that individuals' social network position, assessed by out closeness centrality, is significantly related to IWB. In order to test hypothesis 1, a simple linear regression was conducted. A significant regression equation was found, $R^2 = .05$, F (1, 101) = 5.14, $p < .05$. Therefore, individuals' central position, assessed by out closeness, is positively and significantly related to IWB. Meaning, the more an individual share innovative ideas with other members of the team, the more an individual

perceive his or her work behaviour as innovative. An almost significant result also was found for in closeness on IWB ($r = .19$, $p < .10$).

Hypothesis 2 predicted a positive relationship between individuals' position in a social network, assessed by ego reciprocity, and IWB. Ego reciprocity had also an almost significant relationship with IWB ($r = .17$, $p < .10$).

Hypothesis 3 predicted a positive relationship between PS and IWB. However, results of the correlation analysis suggested that PS was unrelated to IWB.

Because PS was found to be unrelated to IWB, preconditions for mediation by PS are not met (Baron & Kenny, 1986). However, mediation effects can take several forms (Zhao, Lynch, & Chen (2010). One form is an indirect only mediation. This means that a mediated effect exists, but that there is not a direct effect. To further validate this possible mediation, a multiple regression analysis was conducted. Nevertheless, findings indeed showed that PS was unrelated to IWB and therefore did not explain any of the variance in IWB, $R^2 = .05$, F (1, 100) = 0.77, $p > .05$.

Other interesting findings of PS are the relationships with the social network variables. To recall, this research suggested that when a person holds a central position in the network and has reciprocal relationships, he or she will perceive more PS. Findings in the correlation analysis is the almost positive and significant relationship between individuals' centrality, as assessed by in closeness, on PS ($r = .25$, $p < .10$). This is interesting, because the results did not revealed any kind of relationship between individuals' centrality, as assessed by out closeness and ego reciprocity, on PS. This means that individuals do not consider PS when they share innovative ideas and when they have reciprocal relationships with other team members, but rather do notice this PS when others share ideas with them.

Discussion and conclusion

Sharing ideas with many others makes individuals' work behaviour innovative

With government's and societies' higher expectations of education to develop new educational knowledge and practices, it becomes more and more important for both academic research as for organization to better understand how IWB and, consequently, innovation arises. Moreover, because in academic literature there is on ongoing debate about which individuals' positions stimulates

innovation. Findings of this research support previous research (e.g. work of Burt, 2000; Reagans & McEvily, 2003; Moolenaar et al., 2012; Tsai, 2000) that suggested that central positions in a social network, as assessed by out closeness, positively relate to innovation, as this study revealed the positive relationship with IWB.

However, hypothesis 1 was only partially supported, as in closeness centrality has been found to be almost significantly related to IWB. Ego reciprocity has also almost been found to be significantly related to IWB. This result could be attributed to the relatively low sample size. Power might have been too low to show a significant effect.

This research also lend support to the importance of collaboration in organizations. Organizations need to address or support collaboration in social networks to emphasize IWB and thereby enhance learning and innovation. Organizations need to stimulate individuals to improve their own connectivity, so that they have easier access to others, and that they can participate in continuous knowledge sharing (Yang & Chen, 2008). Regarding educational organizations, sharing innovative ideas about educational renewal enhances the creation of new instructions, practices, and eventually may lead to higher quality of education and increased learning outcomes.

Psychological safety that may not feel safely

This study has found no significant support for the hypothesis that a higher perceived PS leads to IWB. Similarly, no significant support for PS to mediate this relationship has found.

This could be attributed to several factors. A possible explanation could be the constraints of PS. Previous research has found that that when individuals perceive high PS, they may perceive high social pressure (Daly, 2012; May et al., 2004). They may feel that normative rules are strongly present in the team. Individuals may tend to act, consciously or unconsciously, according to those implicit normative rules. This means that they will not take interpersonal risks and will not come with innovative ideas, because those ideas may differ from the already established behaviour routines (May et al., 2004). In fact, individuals can feel that when they do come up with other, unconventional, ideas, they face the change of being isolated of the team, which ultimately may leads to non IWB behaviour (Daly, 2012).

This assumption can also be drawn based upon findings of the correlations between centrality measures and PS. These results showed interesting contrasts. First of all, individuals' out closeness and the amount of individuals' reciprocal relationships did not affect their perceived PS. A possible explanation is that more and reciprocal relationships may enhance social pressure, due to the fact that these type of relationships increase the feeling that behaviours should be in alignment with the behavioural norms of the group (Daly, 2012; Burt, 1992; Granovetter, 1993; Krackhardt &Kilduff, 1990; May et al., 2004).

Contrasting, in closeness centrality was found to have an almost significant relationship with PS. Due to the relatively low sample size, power might have been too low to show a significant effect. However, it is interesting to interpret this finding. Thus, although people do not perceive PS when they share their ideas with many others, they do feel psychologically safe when they receive many innovative ideas of their team members. A possible explanation could be that when others reach out to individuals, those individuals feel that their colleagues value their cognitive resources, consequently perceive self- consciousness, and therefore feel psychologically safe in the team (Kahn, 1990; May et al., 2004). Individuals do not have to be insecure about opinions of others about them. The fact that team members approach them, confirm their feelings of self-consciousness. Further research may uncover these contradictions between in and out closeness, as these centrality measurements are implicating different outcomes on other variables.

Another possible explanation for this non-significant result could be attributed to an inconsistent measurement of PS. Respondents of the educational consultancy company received a list of their team members of their sub teams. At the College of Higher Educational, the whole department was initially seen as one social network. This choice was made on behalf of the department manager of this organization (note that the teams were measured apart, because of the low response of one team). Respondents of the College of Higher Vocational Education received a list of all team members of the whole department and not a list of the team members of their sub team. Respondents were also asked to fill in the IWB and PS questions regarding all team members of the department. This may

have led to ambiguity towards the perception of PS. Perhaps respondents felt not psychologically safe within the whole department, but did so in their own team.

Nevertheless, this study attempted to assess a psychological aspect that mediated between individuals' centrality and IWB. Further research could investigate other psychological mechanisms that could mediate between individuals' social network positions and IWB.

Perhaps, the necessity to examine a mediation between this relationships is questionable, because sharing ideas in relationship with IWB may seem as a logically and direct relationship. However, it is important to consider psychological factors for organizations. When there is a mediating factor, an organization can attempt to enable, support, and stimulate required conditions of this factor in order to increase sharing ideas, and therefore enhance IWB. For example, perhaps it is not relevant that one feels safe in the team, perhaps it is more important that individuals feel commitment towards the team and have a sense of belongingness in order to collaborate, interact, and share ideas (Hülsheger, Anderson, & Salgado, 2009). Research could for example focus on cohesion as a psychological characteristic, which mediates between individuals' position in a social network and IWB. In attempt to stimulate this cohesion, organizations can focus on group activities to strive for a common goal and shape a culture that enhance individuals' feeling of pride towards the organisation (Kozlowski & Ilgen, 2006).

Sharing ideas for innovative work behaviour to thrive

Although some psychological factors have not be revealed to contribute to IWB, organizations can still learn lessons of this study. Findings of this study clearly add value for educational organizations to the awareness that IWB is derived from individuals who share innovative ideas regarding educational renewal. Moreover, findings emphasize the benefits educational organizations can have on the exchange of ideas in relationship with learning.

Additionally, findings of this study will hopefully stimulate further investigation into the factors that may mediate the relationship between individuals' position in social networks and IWB. Especially in the light of the increasing demand for high quality education and student outcomes.

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Appendix A Questionnaires in Dutch

Algemene vragen

Wat is uw naam?

Wat is uw geslacht

Wat is uw leeftijd?

Hoeveel jaar heeft u ervaring in het onderwijs

Hoeveel jaar heeft u ervaring in dit team?

Sociale netwerkvraag

Met wie uit uw team deelt u ideeën over onderwijsvernieuwingen?

Innovatief werkvermogen

Ik bedenk nieuwe ideeën voor moeilijke problemen.

Ik ga op zoek naar nieuwe manieren of instrumenten voor mijn werk om tot vernieuwing te komen

Ik ontwikkel originele oplossingen voor problemen.

Ik creëer draagvlak voor innovatieve ideeën.

Ik probeer steun te krijgen wanneer ik iets nieuws bedenk.

Ik maak leidinggevenden van de organisatie enthousiast voor innovatieve ideeën.

Ik vertaal innovatieve ideeën naar bruikbare toepassingen.

Ik werk systematisch aan het introduceren van innovatieve ideeën.

Ik ga na in hoeverre innovatieve ideeën waardevol zijn geweest.

Psychologische veiligheid

Wanneer iemand uit het team een vergissing maakt wordt dit tegen diegene gebruikt.

Het is moeilijk om in dit team kwesties en problemen te bespreken.

Teamleden worden afgewezen omdat zij anders zijn.

Het is moeilijk om andere leden van mijn team om hulp te vragen

In dit team worden de bijdragen van anderen gewaardeerd.