

Is There a Relationship Between Individual Learning, Team Learning, and Organizational Learning?

Sumeth Tanyaovalaksna¹, Xiaobin Li²

University of Toronto¹, Brock University²

Scholars suggest that there is a need for more research, particularly quantitative designs, that aim to examine the relationship between individual learning, team learning, and organizational learning. The purpose of this study is to investigate whether there is a relationship between perceived individual learning, team learning, and organizational learning. With a survey we collected data from 106 laboratory supervisors in Ontario hospitals to answer four research questions: 1) Is there a relationship between perceived individual learning and team learning?; 2) Is there a relationship between perceived individual learning and organizational learning?; 3) Is there a relationship between perceived team learning and organizational learning?; 4) Is there a relationship between perceived individual learning, or team learning, and a component of organizational learning? We found positive answers to the first three questions, but the answer to the last question was a little more complicated.

Les chercheurs proposent qu'il faille pousser la recherche, notamment les études utilisant des modèles quantitatifs, qui portent sur le rapport entre l'apprentissage individuel, l'apprentissage en équipe et l'apprentissage organisationnel. L'objectif de cette étude est de déterminer s'il existe un rapport entre l'apprentissage individuel, l'apprentissage en équipe et l'apprentissage organisationnel tel que perçu par les participants. Par le biais d'un sondage, nous avons récolté des données de la part de 106 superviseurs de laboratoire dans des hôpitaux en Ontario qui ont répondu à quatre questions : 1) Existe-t-il un rapport entre l'apprentissage individuel et l'apprentissage en équipe tel que perçu par les participants? 2) Existe-t-il un rapport entre l'apprentissage individuel et l'apprentissage organisationnel tel que perçu par les participants? 3) Existe-t-il un rapport entre l'apprentissage en équipe et l'apprentissage organisationnel tel que perçu par les participants? 4) Existe-t-il un rapport entre l'apprentissage individuel, ou l'apprentissage en équipe et une composante de l'apprentissage organisationnel? Nous avons trouvé des réponses affirmatives aux trois premières questions, mais la réponse à la dernière est un peu plus compliquée.

The purpose of this study was to investigate whether there was a relationship between perceived individual learning, team learning, and organizational learning among Ontario hospital clinical laboratory supervisors. While focused on the health care system, this study may have educational implications as well as schools should be learning organizations where participants continually expand their capacities to create and achieve and the organization expands its capacity for innovation and problem solving (Hoy & Miskel, 2012). In studying learning in

organizations, some researchers have used instruments that incorporate individual learning (Moilanen, 2005), while others have placed emphasis on team work (Goh & Richards, 1997). Yang, Watkins, and Marsick (2004) investigated the relationship among various dimensions of organizational learning in the Dimensions of the Learning Organization Questionnaire (DLOQ). They found that individual learning dimensions had a positive correlation with organization learning dimensions. However, their results were in conflict with those of Chan (2003) and Chan, Lim, and Keasberry (2003) who examined the same relationships. Yang et al. (2004), Chan (2003), and Chan, Lim et al. (2003) mainly investigated the relationship between individual learning and dimensions considered components of organizational learning: open-mindedness, commitment to learning, and shared vision.

Despite scholars' suggestions that there is a strong need to examine the linkages between individual learning, team learning, and organizational learning (Crossan, Lane, White, & Djurfeldt, 1995), few quantitative studies have appeared in the literature. What studies have appeared show conflicting results (Chan, 2003; Chan, Lim et al., 2003; Yang et al., 2004). Most of the literature on individual learning, team learning, or organizational learning consists of qualitative studies that describe one or two of these phenomena without convincingly demonstrating the linkages among them (Altman & Iles, 1998; Antonacopoulou, 2006; Bontis, Crossan, & Hlland, 2002; Crossan, Lane, & White, 1999; Edmondson, Bohmer, & Pisano, 2001; Friedman, 2001; Kim, 1993; Leithwood, 1998; Marsick & Neaman, 1996; Mitchell & Sackney, 2000; Ross, Smith, & Roberts, 1994; Senge, 1990; Senge, Roberts, Ross, Smith, & Kleiner, 1994; Yeo, 2002a, 2002b). The unsettled issue whether individual learning contributes to organizational learning needs to be clarified so we can have a better understanding of the relationship between individual learning, team learning, and organizational learning.

If individuals acted as learning agents in teams and organizations (Kim, 1993), this study was likely to find a positive relationship between perceptions of individual learning, team learning, and organizational learning. This thought led to the following four research questions:

1. Does perceived individual learning have a relationship with team learning?
2. Does perceived individual learning have a relationship with organizational learning?
3. Does perceived team learning have a relationship with organizational learning?
4. Does perceived individual learning, or team learning, have a relationship with any component of organizational learning?

Literature Review and Theoretical Framework

Organizations learn through individuals who act as agents to create knowledge (Kim, 1993). These agents consist of front line employees (Friedman, 2001), leaders (Sadler, 2001), board members (Tainio, Lilja, & Santalainen, 2001), consultants (Antal & Krebsbach-Gnath, 2001), and teachers (Fauske & Raybould, 2005). In order to make knowledge explicit, individuals have to work within teams so that they can share information. Friedman (2001) indicated that individuals who are likely to act as learning agents are critical, proactive, aspiring, independent, but cooperative. Learning agents are thinkers who invest their time to inquire and analyze problems. They are more successful in persuading organizations to learn when problems are identifiable and easily defined and when people in the organization agree on the same problems.

Leaders who act as a link in organizational learning see themselves as change agents. They show courage, believe in people, are inspirational, and are able to cope with complexity. In addition, a transformational leader believes in lifelong learning and views mistakes as opportunities to learn (Sadler, 2001).

There are three possible pairs of learning relationships in organizations: 1) individual learning and team learning, 2) individual learning and organizational learning, and 3) team learning and organizational learning (Chan, 2003; Friedman, 2001; March, 1991; Yang et al., 2004). In schools, individual learning is a precursor to group and organizational learning. Both group learning and organizational learning are measurable and exist beyond individual teachers (Fauske & Raybould, 2005). For every point in an individual cycle of learning, there is an equivalent in team learning. For instance, when individuals personally reflect, teams publicly reflect or while team members coordinate their action, individuals implement their plan (Ross et al., 1994). Senge et al. (1994) defined team learning as transforming conversational and collective thinking skills so that groups of people could reliably develop a team intelligence and abilities greater than the sum of individual members' talents. Senge (1990), an educator, used the metaphors of molecules transforming iron into a magnet or several musical instruments playing in harmony to create jazz music to illustrate his theory. Edmondson (2002) viewed team learning as a collective decision to change. She defined team learning as a process in which a team takes action, obtains and reflects upon feedback, and adapts by making changes. Two educators, Mitchell and Sackney (2000), suggested that in schools team learning happens in a collaborative process in which members distribute knowledge, become part of a collective discourse, and expand professional capacity. Team members clearly understand their tasks, share a sense of purpose, and do not avoid conflict in disagreement. Another educator, Leithwood (1998), pointed out that team members need to learn two things. First, they have to develop a shared understanding of the team and what collective action is required to accomplish its purposes. Second, as an individual teacher, a person must know what kind of contributions he can make for the collective learning of a team.

Studying bank managers in England, Antonacopoulou (2006) found that individual learning is affected by three organizational practices: 1) context of learning, 2) politics of learning at work, and 3) institutional identity of learning. English banking institutions influenced individual learning by defining what and how bank managers should learn. This led to learning that maintained, rather than challenged, the organizational status quo. Her work supported the findings by Chan (2003) and Chan, Lim et al. (2003) that individual learning does not have a positive correlation with organizational learning. Yet, Yang et al. (2004) found that organizations learn from individuals and teams. March (1991) also reported that an organization learns from its members and accumulates knowledge over time.

One method that organizations use to improve their performance is the team building process. There is empirical evidence to confirm the long standing hypothesis that team learning enhances team performance (Chan, Pearson, & Entekin, 2003; Edmondson, Bohmer, & Pisano, 2001). In schools team learning is a discipline through which small groups of people transform their collective thinking, learning to mobilize their energies and actions to achieve common goals. Team learning can be fostered inside classrooms and in pilot groups that pursue successful school change (Senge et al., 2012). However, team learning in the same organization is not always uniform. As Edmondson (2002) suggested, task relationships and distribution of power in the team are important features of effective team learning. Edmondson found three types of teams: 1) teams that reflect and change, 2) teams that reflect without change, and 3)

teams that neither reflect nor change. The first type of team is beneficial as it leads to improvement in the organization. Team members in the second type have task independence which allows them to act separately. The third type has dominant leaders that make members reluctant to express their opinions and demand change. Edmondson et al. (2001) suggested that teams that engage in real time learning, drawing on the lesson learned while the process is underway, are more effective than those that take action after analysis. The research referred to above is in agreement with Altman and Iles (1998), Bontis et al. (2002), Kim (1993), and Yeo (2002b), who suggested that organizations learn from both individuals and teams. However, Crossan et al. (1995) suggested that there is a serious need for research to examine the relationship between individual learning, team learning, and organization learning.

At least two distinctive models appear in the literature on how levels of learning are linked. The first model is sequential without a feedback mechanism between the learning levels. It starts with individuals who seek relevant information for their goals (Yeo, 2002a, 2002b). Individuals' seeking information leads to learning that is transferred to the teams and, in turn, learning is passed to the organization. An organization must have a strategic management plan to learn. The alignment of strategic management and team learning leads to organizational learning that changes organizational behaviour and employees' attitudes. Yeo (2002b) labeled the three learning levels as single, double, and triple loop learning.

There are at least three variations in the second model of learning levels. In the first variation Kim (1993) proposed a more complex model that incorporated Senge's (1990) mental model, Lewinian's conception of experiential learning, and Argyris and Schon's (1978) understanding of single and double loop learning. Single loop learning occurs when mismatches between expectations and outcomes are corrected by changing individual actions, but an organization's underlying norms, policies, and objectives are retained. Double loop learning occurs when mismatches are corrected in ways that involve the modification of an organization's underlying norms, policies, and objectives (Argyris & Schon, 1978). In Kim's (1993) model individuals use an observe-assess-design-implement cycle to create the organization's worldview and organizational routines. Both individual and organization can take actions that elicit environmental responses that confirm or deny their beliefs. Kim, however, proposed that individual action came from single loop learning while organizational action resulted from double loop learning. Kim's model did not explicitly show team influence, but he considered teams to be extensions of individuals. Thus, one can replace "individual" in the model with "team."

The second variation views organizational learning as a process that transforms inputs into outputs. Altman and Iles (1998) identified values of society and industry, physical goods and technology, and human and capital resources as inputs. These inputs are transformed into outputs, such as flexibility, adaptation, survival, increased capital, and improved performance. Individual and team learning have a mutual influence, as do team and organization learning; however, it is the leadership of the organization that mediates the function between the organization and its members.

The third variation of the second model was proposed by Crossan et al. (1999), who also viewed organizational learning as inputs-process-outputs. However, Crossan et al. incorporated March's (1991) theory on individual learning through exploration and exploitation. They proposed a 4I framework (intuiting, interpreting, integrating, and institutionalizing), reflecting their belief that individuals learn through intuition and interpretation. Individuals share their ideas with others in the integration process. Individual and team ideas are integrated and

institutionalized in organizations. The process is dynamic in that knowledge stocks flow forward from individuals to teams, from teams to the organization, and from individuals to the organization. At the same time, there is a reverse mechanism that feeds the information back to individuals and teams. This idea was further developed into stocks and flow of knowledge and was incorporated into a survey instrument by Bontis et al. (2002).

The theoretical framework for this study was based on the model proposed by Kim (1993) that stated individuals or teams act as learning agents on behalf of organizations. The actions of individuals or teams lead to responses from organizations. These responses result in organizational learning, specifically error detection and correction. Sinkula, Baker, and Noordewier (1997) suggested that the core components of organizational learning are open-mindedness, commitment to learning, and shared vision. Open-mindedness (OM) is the organizational ability to question long held routine assumptions and beliefs. Commitment to learning (CL) is an organizational value that is likely to promote a learning culture. Shared vision (SV) influences the direction of learning. Together, these three components explain the direction and intensity of learning in an organization.

At least two hospitals in Ontario understand the benefit of organizational learning as indicated by their statements that they are learning organizations (North York General Hospital, 2013; Trillium Health Centre, 2012). Clinical laboratories, departments within hospitals, have to work under general hospital policies. However, there is no published literature on organizational learning in these laboratories. This study is the first empirical research on organizational learning in Ontario hospital laboratories, which will increase our understanding of how laboratory supervisors perceive individual learning, team learning, and organizational learning. The results can benefit hospital executives in two aspects. First, with the results from this study hospital executives will learn about laboratory supervisors' perceptions of individual learning, team learning, and organizational learning, and how they are related. Second, with the results from this study executives will know where to target their educational resources to promote organizational learning as supervisors perceive it.

The focus of this study was the relationship between perceived individual learning, team learning, and organizational learning. We obtained information from Ontario hospital laboratory supervisors in acute care general hospitals with more than 100 beds because these laboratory supervisors act as a conduit of communication between top managers and their subordinates. They have better access to information and continuing education resources and they decide the education budget in their laboratories.

Method

This research examined whether there was a relationship between perceived individual learning, team learning, and organizational learning, using survey results from supervisors in Ontario hospital laboratories. Kim (1993) suggested that in the relationship between individual learning and organizational learning individual learning was the independent variable and organizational learning was the dependent variable. Kim also suggested that individual learning affected team learning. Therefore, in this study perceived individual learning was the independent variable and perceived team learning was the dependent variable. Likewise, perceived team learning was the independent variable and perceived organizational learning was the dependent variable. The study investigated whether there was a relationship between:

1. perceived individual learning (independent variable) and perceived team learning (dependent variable);
2. perceived individual learning (independent variable) and perceived organizational learning with three components (dependent variables);
3. perceived team learning (independent variable) and perceived organizational learning with three components (dependent variables);
4. perceived individual learning, or perceived team learning (independent variable), and a component of perceived organizational learning (dependent variable).

Instrumentation

The survey questionnaire used in this study to measure participants' perceptions of learning was developed from the combination of three previous instruments: Sujan, Weitz, and Kumar's (1994) instrument measuring individual learning, Edmondson's (1996) instrument measuring team learning, and Baker and Sinkula's (1999) instrument measuring organizational learning, which had three components: 1) open-mindedness, 2) commitment to learning, and 3) shared vision. All three previous instruments measuring perspectives about learning were tested and considered reliable and valid. Research participants in this study indicated the extent to which they agreed with the statements on the survey questionnaire using a Likert scale from 1 (strongly disagree) to 7 (strongly agree). The higher a participant scored a statement on the survey, the more learning the participant felt there was. The survey had five sections: individual learning (IL), team learning (TL), open mindedness (OM), commitment to learning (CL), and shared vision (SV).

Site and Participant Selection

Regulation 964 of the Public Health Hospital Act classified Ontario hospitals into 22 groups depending on the size of the hospital and type of treatment offered (Ontario Ministry of Health and Long-Term Care, 1990). Among these 22 hospital groups, only two groups consisted of general hospitals with more than 100 beds. These were the two groups of hospitals that participated in the study. On average each laboratory in most of these large hospitals had six supervisors.

Data Collection

After receiving ethical approval to conduct the study from our university, one of the authors contacted the hospitals via email and telephone. The laboratory managers, directors, or designated personnel of the participating hospitals received the survey in bulk by mail in early January 2009. They distributed the survey packages with a letter of invitation and a self-addressed envelope to colleagues in their laboratories who were supervisors. Twenty-nine hospital laboratories participated in this study. A total of 197 surveys were mailed out and by late March 109 surveys were returned, representing a 56% response rate. The respondents consisted of 14 males, 89 females, and six with no gender indicated. The respondents indicated that they had been in their positions from one month to 41 years with an average of 14 years.

The survey comprised five demographic questions, nine items in the individual learning section (IL1 to IL9), seven items in the team learning section (TL1 to TL7), six items in the open-mindedness section (OM1 to OM6), six items in the commitment to learning section (CL1 to CL6), and six items in the shared vision section (SV1 to SV6), for a total of 34 items. Once completed surveys were returned, data analysis began with data assessment for missing values, outliers, and normality, followed by statistical analysis and validation of the results.

Data Analysis

This study tested the reliability of the data obtained with the survey using Cronbach's coefficient for each of the five sections, which were considered the five variables. Four variables (team learning, open-mindedness, commitment to learning, and shared vision) had a Cronbach's alpha value above .7, but individual learning only had a value of .67, making it a questionable result. IL1, "there are not a lot of new things to learn in my job," showed poor correlations with other items in the same section. There was no item to item correlation greater than .3 and it had an item to total correlation of only .11. This item was removed and the repeated reliability test showed that the value of the individual learning section with the remaining eight items was increased to .75.

The first step of data analysis assessed missing values and outliers of the remaining 33 items in the survey using the Extreme Studentized Deviate test. As recommended by Hair, Black, Babin, Anderson, and Tatham (2006), the data were investigated with SPSS missing value analysis for extent, randomness, and missing patterns. Three respondents with excessive missing values were deleted from further data analysis, resulting in 106 remaining respondents. When missing values are below 10 percent, as was the case with the remaining 106 respondents in this study, imputation methods are valid (Hair et al., 2006). In this study, mean substitution was the method of replacing missing values. An examination of the data indicated that a few outliers were within the accepted range.

The second step in the data analysis was to inspect the normality of the data using the Shapiro-Wilks normality test. Variables that failed the normality test were transformed and rechecked. Descriptive statistics provide researchers with insights into the characteristics of the data strategize for the next steps in their analysis. Mean is the average value of the data and standard deviation is the spread of the values around the mean. When data are normally distributed, the data exhibit a bell shape in a graph. Following missing value, outlier, and normality analysis, we conducted our statistical analysis.

The analysis began with a scatter plot to visually inspect whether there was a relationship between perceived individual learning and team learning. The scatter plot displayed a positive relationship. Both perceived individual learning and team learning were independent variables, while the three components of organizational learning were the dependent variables. Individual learning and team learning might have had their own individual effect on organizational learning. In addition, it was also possible that the two independent variables could have had a combined effect on the dependent variables. Investigating the relationship between two independent variables and three dependent variables required a statistical procedure that simultaneously examined the relationship between two independent variables and multiple dependent variables. Canonical correlation analysis is one of the few techniques that enable researchers to study the relationship of two variable sets. Hair, Anderson, Tatham, and Black (1998) stated that "with multiple dependent and independent variables, canonical correlation is

the most appropriate and powerful multivariate technique” (p. 444). In this study, the possible relationship between the dependent variable set and the independent variable set could be written in general and specific forms as

$$Y_1 + Y_2 + Y_3 = X_1 + X_2$$
$$aOM + bCL + cSV = dIL + eTL$$

In the first equation Y's were dependent variables and X's were independent variables and in the second equation a, b, c, d, and e were the coefficients of variables. OM, CL, and SV were variables in the dependent variable set, and IL and TL were variables in the independent variable set.

Canonical correlation, however, did not specify which independent variable, IL or TL, had a relationship with which dependent variable, OM, CL, or SV. Because of this limitation, we selected set correlation analysis to study the possible relationship between the individual variables of the two variable sets. Set correlation analysis allows researchers to investigate the relationship between social constructs and their components. For example, does perceived individual learning, or perceived team learning, have a relationship with one or more of the three components of perceived organization learning (open-mindedness, commitment to learning, or shared vision)? As set correlation analysis allows researchers to directly investigate partial relationships between the independent variable set and the dependent variable set, it has an advantage over canonical correlation analysis for this study. Canonical correlation analysis and set correlation analysis enabled us to answer research questions two, three, and four: does perceived individual learning have a relationship with perceived organizational learning?; does perceived team learning have a relationship with perceived organizational learning?; does perceived individual learning, or perceived team learning, have a relationship with any component of perceived organizational learning?

Hair et al. (2006) recommended validating statistical analysis results with the following three procedures:

1. Split the sample into two halves and use one subsample to estimate the model while keeping the other half for validation;
2. Collect a new set of data from different participants from the same population; and
3. Use a bootstrap technique to draw random subsamples from the sample. Depending on the capability of the computer, researchers can draw subsamples 1,000 or 2,000 times, estimate the interested parameters, and calculate their expected ranges.

The sample size in this study was not large enough to allow splitting it into two subsamples. It would take extra effort, time, and expense to recruit another sample of participants. Therefore, bootstrapping was employed in this study. Following Stine (1989), this study used the minimum amount of resampling, 1,000 replications, to validate the results from conventional statistical tests of linear regression and canonical correlation analysis.

Results

Among all of the survey responses, the responses to IL2 of the individual learning section, “an important part of becoming a good employee is to continually improve work skills,” had the highest mean (6.43) and a small range (5-7), indicating that respondents generally agreed that they continued to improve themselves. The grand mean of the individual learning section (5.61) was the highest among the five sections.

The grand mean of the team learning section (4.49) was not as high as the individual learning section. TL2, “my team handles differences of opinions privately or off-line, rather than publicly,” had a mean of 3.80, below the mid-point of 4 on the Likert scale. This suggested that the majority of the supervisors in the study thought that their teams did not have open discussions when a difference of opinions existed.

The open-mindedness and commitment to learning sections had grand means of 4.74 and 4.91 respectively. With a grand mean of 4.05 for the shared vision section, the lowest among the five sections, almost half of the respondents did not agree with statements in the shared vision section, as three of its six items had means less than 4, the middle point. In addition, SV4, “employees view themselves as partners in charting the direction of the business unit,” received the lowest mean in the survey (3.54).

Scores from all items in the IL, TL, OM, CL, and SV sections for each participant were totalled and then averaged to create summated scores: AIL, ATL, AOM, ACL, and ASV. These summated section scores were further investigated for outliers and normality. No outliers were observed, but the Shapiro-Wilk normality test indicated that the distributions of AIL, ATL, and ACL summated scores differed significantly from normality. After we tried multiple types of transformation, AIL and ACL emerged as normal with reflection and square root, while ATL needed reflection and logarithm to reach normality.

We used linear regression to investigate whether there was a relationship between perceptions of individual learning and team learning. The results suggested that there was a positive correlation between the perceptions of individual learning and team learning. In addition, 31% of the variance in perceived team learning was explained by the variance in individual learning ($R^2 = .31, p < .01$). With regard to the first research question, the results indicated that perceived individual learning was positively correlated with team learning. The estimated model of the relationship between perceived individual learning and team learning was

$$TL = 0.11 + 0.27 IL$$

where the estimated TL scores were equal to 0.11 plus 0.27 times IL scores.

To validate the regression results we used the bootstrap technique, which yielded the same results as those from the regression results. Both coefficients for the constant (0.11) and slope (0.27) from the bootstrap were the same as the regression results (0.11 and 0.27), indicating that the regression coefficients were valid.

Canonical correlation analysis was used to answer research questions two and three: was there a relationship between perceived individual learning and organizational learning, and was there a relationship between perceived team learning and organizational learning. Results indicated that perceived individual learning and team learning combined had a positive correlation with organizational learning ($R^2 = .52, p < .01$). Individually, individual learning and

team learning also had a correlation with organizational learning. The loading was .97 for individual learning and .73 for team learning. The loadings for the three dependent variables (open-mindedness, commitment to learning, and shared vision) were .92, .94, and .70, respectively. We used the bootstrap technique, with 1,000 replications, to validate the canonical correlation analysis results. The bootstrap technique produced similar results to the canonical correlation analysis results and thus validated them.

The canonical correlation analysis results, however, did not indicate which component of organizational learning had a relationship with perceived individual learning, or perceived team learning. To explore which component contributed to the correlations we utilized set correlation analysis. We conducted a series of partial correlation analyses with the set correlation procedure. The results indicated that there was a significant positive correlation between IL and the dependent variable set (OM, CL, and SV) ($R^2 = .26, p < .01$) and between TL and the dependent variable set ($R^2 = .19, p < .01$). There was also a significant correlation between the independent variable set of IL and TL and the dependent variable set of OM, CL, and SV ($R^2 = .43, p < .01$), supporting the canonical correlation analysis results ($R^2 .42, p < .01$). In addition, IL had a significant correlation with OM ($p < .05$), but TL did not. TL had a significant correlation with CL ($p < .05$), but IL did not. Neither IL nor TL had a relationship with SV. The independent variable set of IL and TL had a significant correlation with OM ($p < .05$) and CL ($p < .05$), but not with SV. The set correlation analysis results revealed the relationships between individual learning and team learning and the three components of organizational learning. Individual learning, but not team learning, correlated with open-mindedness. Team learning, but not individual learning, correlated with commitment to learning. Individual learning and team learning combined had a correlation with open-mindedness and commitment to learning. Neither individual learning nor team learning had a relationship with shared vision, not even when the two independent variables were combined.

In summary, the results from linear regression, canonical correlation, and set correlation analysis answered the research questions as follows: Based upon participants' perceptions, 1) there was a positive correlation between perceived individual learning and perceived team learning; 2) there was a correlation between perceived individual learning and perceived organizational learning; 3) there was a correlation between perceived team learning and perceived organizational learning; and, 4) open-mindedness contributed to the correlation between perceived individual learning and perceived organizational learning, but commitment to learning contributed to the correlation between perceived team learning and perceived organizational learning.

Discussion

The grand mean of the perceived individual learning section was 5.61, high above the middle score of four. This suggested that laboratory supervisors generally believed they were engaged in individual learning, which hospital chief executive officers should find encouraging. In the individual learning section, responses to item two, "continually improve work skills," had the highest average ($M = 6.43$) and the lowest standard deviation ($SD = .63$) of all items in the section. This indicated that most supervisors agreed that they continued to improve their work skills through learning. The lowest mean (4.75) of the individual learning section was obtained from item seven, "making mistakes is just part of the learning process." The relatively low mean of this item indicated that some laboratory supervisors did not agree with this statement. This

may result from the fact that mistakes in laboratories can have serious effects on patients' well-being. Patients can be hurt and even lose their lives as a result of laboratory errors. In addition, our society often attempts to assign blame for mishaps on individuals so it can impose a penalty. This logic assumes that only individuals make mistakes and nothing is wrong with the system. By removing incompetent individuals the system can restore itself. This kind of thinking puts people who make mistakes on the defensive and they may try to cover their errors. It also discourages learning in organizations.

The team learning section showed a wide range of opinions as indicated by a greater standard deviation. Good teams normally discuss their difference of opinions openly and not in private (Edmondson, 1999). Item two of this section, "my team handles differences of opinions privately, or off-line, rather than publicly," had the lowest mean (3.79), suggesting that the majority of the supervisors in the study disagreed with this statement. This may indicate that the handling of conflicts in clinical laboratories occurs behind closed doors. A recent study showed that trust and social interaction are positively correlated with the degree of knowledge sharing and collective learning (Wu, Hsu, & Yeh, 2007). Therefore, the low mean for this item may indicate that trust is a concern among the supervisors who participated in the study. Trust is one of the key factors that promotes team learning.

In clinical laboratories staff turnover rates are low and members perform the same task repeatedly, meaning that their work falls into the stable team category. This type of team often does not place emphasis on learning until an external crisis forces members to change their attitudes (Clutterback, 2002). The supervisors in this study did not rank item five on reflection ($M = 4.17$) and item six on testing work assumptions ($M = 4.83$) very highly. This suggested that some of the supervisors were not engaged in reflection and in testing work assumptions. They may have preferred to simply follow the orders of authorities. Nissila (2005) suggested that collective dialogue in the reflection process creates exploration of complex and subtle issues which leads to team learning. Reflection as a team prevents individual members from jumping to conclusions and helps members understand their real problems. Reflection encourages team members to think critically and work collaboratively. It is one of the critical steps of action learning (Kesby, 2008). Laboratory supervisors can make progress in team learning through open discussion among themselves.

In the open-mindedness section the individual item means ranged from 4.52 to 4.98. Most supervisors seemed to agree with the statements, but there was a wide-range of opinions as reflected by the standard deviations. This may be the result of the workplace environment where unions and management disagree over how to manage change. When facing financial difficulties, hospitals use layoff and downsizing as ways to reduce expenses and increase efficiencies. Ontario hospital laboratories have been target of budget reductions over the past 15 years. Laboratory personnel have seen their working conditions deteriorate through increased workloads and more frequent shift work. These working conditions are creating conflicts between labour and management, hindering learning in organizations, and making staff resistant to change. Studies in organizational learning show that open-mindedness leads to increased innovation and improved knowledge sharing (Liao, 2006), performance (Calantone, Cavusgil, & Zhao, 2002), and customer relations (Argyris, 1999). In laboratories that have highly protocol-dependent reward systems that emphasize error free details, it is not easy for employees to experiment and try something outside their realm of knowledge. However, open-mindedness would lead to a higher level of understanding of the processes in organizations.

Among the items in the commitment to learning section, laboratory supervisors gave the highest mean ($M = 5.09$) to item one, “learning as a key to improvement.” However, commitment to learning can only be discerned when training is available on the job and there is a clear linkage between learning and working practice (Goodwin & O'Connor, 2007). Supervisors in this study showed a moderate agreement on other items in this section, with means ranging from 4.81 to 4.83.

Three of the six items in the shared vision section had means below the middle point, suggesting that supervisors did not have a high opinion of this component of organizational learning. Item four, “employees view themselves as partners,” received the lowest mean of 3.54 among all 33 items analysed in the survey. These responses may have resulted from a lack of communication amongst laboratory supervisors. One supervisor commented that the “top leadership team deliver[s] information on a need to know” basis. Carroll and Edmondson (2002) found that creating a sense of shared purpose in a workplace required broad participation, open communication, and resources. However, creating a shared vision required real effort from management. Simply posting the mission and vision statements on the wall was not enough. Given the real possibility that hospital workers could lose their job or face a financial penalty for making an error, a well communicated shared vision could uplift people’s on the job aspirations.

The linear regression analysis results suggested that there was a positive correlation between perceived individual learning and team learning. Canonical correlation analysis results told us that both individual learning and team learning were correlated with organizational learning. As the results indicated that perceived individual learning correlated with both team and organizational learning, they supported Kim’s (1993) model that positioned individuals as agents for both team and organizational learning. Set correlation analysis results indicated that individual learning correlated with open-mindedness, but not with commitment to learning. Team learning, on the other hand, correlated with commitment to learning, but not with open-mindedness. Individual learning and team learning individually and combined had no relationship with shared vision. The results that individual learning and team learning had no relationship with shared vision contradicted scholars who suggested that shared vision was the core component of organizational learning (Clark & Fujimoto, 1990; Huffman, 2003; Senge, 1990). In the shared vision section, the responses to the statement “there is a total agreement on our business unit vision across all levels” had a mean of 3.71, while the responses on employees viewing themselves as partners had an even lower mean of 3.54. These two items had the lowest means among all the 33 items analysed. The low means in this section indicated that the majority of the supervisors did not agree with the statements in the shared vision section.

Conclusions

This study examined the opinions of Ontario laboratory supervisors towards individual, team, and organizational learning. The results indicated that:

1. there was a positive correlation between perceived individual learning and perceived team learning;
2. there was a correlation between perceived individual learning and perceived organizational learning;

3. there was a correlation between perceived team learning and perceived organizational learning;
4. perceived open-mindedness contributed to the correlation between perceived individual learning and perceived organizational learning, but perceived commitment to perceived learning contributes to the correlation between perceived team learning and perceived organizational learning.

Since perceived individual learning had a positive correlation with perceived organizational learning, and organizational learning correlated with organizational performance (Baker & Sinkula, 1999; Goh & Ryan, 2008; Lopez, Peon, & Ordas, 2005), there is potential for employees at all organizations to contribute to the learning in their organizations. By opening up their minds and providing psychological safety to employees, employers can reap the benefit of organizational learning, including better responses to external pressure and improved customer relations (Argyris, 1999). Without fear of being penalized, employees are more likely to question incorrect assumptions of their routine practice, which can lead to change and improvement in organizations.

One limitation of this study was that it did not observe how participants interacted and behaved in their work environment, nor did it study actual learning in any direct way. The survey only asked participants about their perceptions of learning in their organizations, which may not be completely accurate because of their bias. A second limitation is the gender imbalance in the sample which may not be representative of laboratory supervisors.

Chan, Lim et al. (2003) suggested that culture may play a part in organizational learning. They suggested that people in certain cultures are brought up to be obedient and respect authority. These people are less likely to question assumptions, leaving them unchallenged. In individualistic North America, people have the right to bargain through their labour unions and to ask questions about their working conditions. In many instances, asking questions creates conflicts, which can create doubt. This doubt may make both sides explore their assumptions. We learn by questioning what we do, why we made mistakes, and how we can correct our mistakes. We engage in dialogues and challenge each other's ideas to improve our understanding and learning. Learning in organizations is the key to improve organizational performance and provides organizations with opportunities to contribute to society. In addition to implications for health care professionals, the results from this study may also have implications for educators. Schools are striving to become learning organizations with teachers working together in an attempt to form effective learning teams, while, at the same time, teachers continue to learn individually to improve students' learning outcomes.

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Sumeth Tanyaovalaksna is a PhD student in the Department of Leadership, Higher and Adult Education at the Ontario Institute for Studies in Education, University of Toronto. He received his MBA from York University and MEd from Brock University. His research interests are in the areas of organizational learning, social justice and diversity in organizations.

Xiaobin Li is an Associate Professor at the Department of Graduate and Undergraduate Studies, Faculty of Education, Brock University in St. Catharines, Ontario, Canada. He received his PhD in Educational Administration from Ontario Institute for Studies in Education, University of Toronto. His research interests include international education, education finance, education law, and quantitative methods in research.