Mediating Effect of Transformative Learning Process on the Psychological Safety and Transformative Learning Outcome among Information Technology Firms in Beijing, China

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Abstract: This paper investigates the mediating effect of transformative learning processes on the relationship between psychological safety and transformative learning outcomes among information technology firms in Beijing, China. With the rapid evolution of the technology industry, fostering a conducive learning environment becomes essential for employee development and organizational success. Drawing on a sample of information technology firms in Beijing, this study explores how psychological safety influences transformative learning outcomes, and whether transformative learning processes mediate this relationship. The research employs a structured questionnaire survey to collect data from employees, focusing on variables related to psychological safety, transformative learning processes, and transformative learning outcomes. Preliminary findings indicate a significant positive association between psychological safety and transformative learning outcomes. Moreover, transformative learning processes, including social support, attitude toward uncertainty, and criticality, demonstrate a mediating effect on this relationship. Specifically, employees who perceive higher levels of psychological safety are more likely to engage in transformative learning processes, leading to enhanced transformative learning outcomes. These results underscore the importance of promoting psychological safety and facilitating transformative learning processes within information technology firms. By fostering a supportive and inclusive work environment, organizations can empower employees to embrace change, cultivate innovative thinking, and ultimately drive organizational success in the dynamic technology landscape of Beijing, China.

Keywords: attitude towards uncertainty, critically, social support, psychological safety, transformative learning

Introduction

Human Resources (HR) are vital to the management of the workforce and the creation of a productive environment in IT firms. They are in charge of attracting, educating, and keeping competent workers who promote technological innovation. HR departments in IT firms are also in charge of employee benefits, performance reviews, and making sure that company policies and labor laws are followed. Their strategic participation contributes to the overall success and expansion of the company by bridging business goals with employee growth and development.

Transformative learning theory is an educational philosophy that emphasizes personal change and growth in the learning process, and sees learning as more than just knowledge transfer or skill acquisition, but as a profound process of ideological transformation. The theory originated in North America in the 1970s and has been particularly influenced by social constructivism and critical theory. Transformative learning theory views learning as a dynamic, ever-changing process that involves a change in the learner's worldview and a fundamental reshaping of knowledge and understanding.

In practice, transformative learning theory is used to design teaching strategies that elicit deep reflection and personalization, such as case studies, role-playing, debates, and project-based learning, to stimulate students' intrinsic motivation and promote their self-discovery and social engagement. This theory emphasizes that education should aim to develop individuals with critical thinking, innovative skills and a sense of social responsibility so that they can adapt and thrive in a rapidly changing world.

Technology companies are often at the forefront of the industry, facing constantly evolving technologies and market trends. In the technology industry, innovation is the key to driving enterprise development and competitive advantage, and innovation is the core driving force for the development of technology enterprises. Employees need to constantly learn and adapt to new technologies, methods, and thinking in order to maintain the competitiveness of the enterprise. Transformative learning encourages employees to actively seek learning opportunities when facing technological changes, and through reflection and practice, combine new technologies and knowledge with existing experiences to achieve self-renewal and improvement. Transformative learning encourages employees to maintain an open and curious attitude during the learning process, be brave enough to try new methods and ideas, and cultivate innovative thinking and problem-solving abilities through reflection and practice.

Although it is necessary to promote transformative learning in the workplace, so far, many studies on transformative learning have mainly used formal educational environments as the background for learning. Kwon, Han and Nicolaides (2020) conducted a study on the impact of psychological safety on transformative learning. Although existing methods are valuable and reasonable, researcher are concerned that adopting the same holistic approach to transformative learning research may limit the scope of new understandings that may arise from new research institutions.

Psychological safety is a psychological concept that emphasizes the emotional and psychological needs of an individual in a given environment. This theory states that in order to ensure an individual's mental health and well-being, it is important to provide a supportive environment where the individual feels understood, respected, and accepted.

Individuals seek emotional support and security when faced with stress, challenges, or uncertainty. This support can help individuals cope with stress, increase self-confidence, and improve their ability to cope with difficulties. In a psychologically safe environment, individuals are more courageous to try new things, express their opinions and feelings, as well as face and solve psychological problems.

Psychological safety theory has been widely used in the fields of education, psychotherapy and organizational management. For example, in education, psychological safety theory emphasizes the creation of a positive, inclusive, and supportive learning environment that promotes students' psychological well-being and academic achievement. In psychotherapy, psychological safety theory emphasizes the development of a relationship of trust and understanding between therapist and patient to help patients overcome psychological barriers. In organizational management, psychological safety theory emphasizes the creation of a respectful, supportive, and motivating work environment to enhance employee performance and satisfaction.

For these reasons, the purpose of this study is to use quantitative methods (mediation analysis) to test that psychological safety is one of the conditions that may increase the potential for transformative learning in the workplace in Chinese technology enterprises. This study timely calls for human resource development scholars to actively participate in internal learning and research. It will benefit human resource development practitioners by gaining a deeper understanding of how to promote transformative learning in Chinese technology enterprises.

Background of the Study

The author's company was founded in 2016 and is a technology company. Over time, researcher have rapidly developed and grown, but researcher is also facing some challenges. One of them is the conflict between the rapid development of the company and the sustainable development of individual employees. The core of this challenge is that as the company's business expands, the individual skills and abilities of employees cannot fully meet the growing needs of the company.

As a member of the company, the researcher realized this issue and led the team to propose an initiative aimed at creating a work environment that supports rapid employee growth. Researcher realize that in order to achieve the long-term development goals of the company, it is necessary to ensure that employees continuously learn and grow in their work.

To achieve this goal, the researcher had taken a series of measures. The researcher had focused on enhancing the psychological security of employees in the company's office space. By establishing an open and inclusive work environment, researcher encourage employees to be willing to ask questions, share ideas, and take risks. This sense of psychological security makes employees feel that their opinions and contributions are respected and valued, thereby stimulating their enthusiasm for learning.

Therefore, it is of great practical significance to study the mediating effect of transformative learning process on psychological safety and transformative learning outcome in Beijing information technology enterprises. Transformative Learning is a profound learning process that involves not only the acquisition of knowledge and the improvement of skills, but more importantly, a fundamental change in the learner's mindset, behavior, and even worldview. This mode of learning emphasizes self-reflection, the development of critical thinking, and the challenge and reconstruction of original beliefs and assumptions in the learning process. In transformative learning, learners promote their personal cognitive development and social practice through interaction with the external environment and exchange of dialogues with different viewpoints. This process encourages learners to think deeply and reflect on their own knowledge systems, values and behavioral patterns, so as to realize the transformation from the original state to a higher level of understanding and a more mature behavioral pattern.

By studying the mediating role of the transformative learning process, Beijing IT enterprises can gain a deeper understanding of their employees' learning needs and work status, and further optimize their training plans and coaching measures. At the same time, enterprises can use the results of this research to establish a more complete employee development system, stimulate the learning potential of employees, enhance their learning motivation and self-development awareness. In this process, the enterprise can also gradually establish a positive learning and innovation culture, provide more development opportunities and platforms for employees, and stimulate the creativity and innovation of the team.

Objectives

This study aimed to explore whether psychological safety has a positive impact on transformative learning in Chinese technology enterprises.

Literature Review

In recent years, there has been growing interest in understanding the mechanisms through which psychological safety influences transformative learning outcomes in organizational contexts. This literature review aims to explore the indirect relationship between psychological safety, transformative learning processes, and transformative learning outcomes, drawing on empirical evidence from the past decade.

Numerous studies have demonstrated its positive association with employee engagement, innovation, and knowledge sharing (Kong et al., 2019; Newman et al., 2017). Moreover, psychological safety has been linked to higher levels of job satisfaction and organizational commitment Li et al. (2020), highlighting its importance for fostering a supportive work environment conducive to learning and growth.

Transformative learning processes encompass various dimensions, including social support, attitude toward uncertainty, and critical reflection, which play pivotal roles in facilitating individual development and learning Dirkx (2012). Social support, characterized by encouragement and validation from others, has been shown to promote learning and well-being in organizational settings Mezirow (2009). Additionally, embracing uncertainty and engaging in critical reflection are essential components of transformative learning, leading to enhanced problem-solving skills and adaptability (Cranton, 2016; Taylor & Cranton, 2012).

Recent research suggests that psychological safety indirectly influences transformative learning outcomes through its impact on transformative learning processes Barrick et al. (2020). By creating an environment where individuals feel safe to express their ideas and take risks, psychological safety fosters social support, encourages exploration of new perspectives, and facilitates critical reflection. These transformative learning processes, in turn, contribute to the development of new skills, attitudes, and behaviors that characterize transformative learning outcomes (Dirkx, 2012; Taylor & Cranton, 2012).

The study of Kim et al. (2020), examines the mechanisms that influence team-level performance. It investigates psychological safety, a shared belief that the team is safe for interpersonal risk taking and a causal model mediated by learning behavior and efficacy. This model hypothesizes that psychological safety and efficacy are related, which have been believed to be same-dimension constructs. It also explains the process of how learning behavior affects the team's efficacy. In a study of 104 field sales and service teams in

South Korea, psychological safety did not directly affect team effectiveness. However, when mediated by learning behavior and efficacy, a full-mediation effect was found. The results show (i) that psychological safety is the engine of performance, not the fuel, and (ii) how individuals contribute to group performance under a psychologically safe climate, enhancing team processes. Based on the findings, this article suggests theoretical and methodological implications for future research to maximize teams' effectiveness.

Kwon et al., (2020) conducted a study about the impact of psychological safety on transformative learning process in the workplace. This study focused on psychological safety as a specific practice that may or may not independently contribute to transformative learning outcomes. Data was gathered from 132 employees in one US manufacturing company through a survey asking about the perception of psychological safety and the experience of transformative learning. A mediation analysis was conducted to test the effects of transformative learning processes – social support, attitude toward uncertainty and criticality – on the relationship between psychological safety and transformative learning outcomes. The results of this study showed that psychological safety led to transformative learning outcomes mediated by transformative learning processes including social support, attitude toward uncertainty and criticality. Existing literature reveals little about the mechanism of how transformative learning occurs in the workplace. This study contributes to the field of human resource development by explaining the relationship between psychological safety and transformative learning, as well as first attempting to use transformative learning as a viable construct in workplace research.

The aim of this article is to discuss the potential of an educative research intervention to influence the quality of the learning outcome in the workplace as interpreted from the perspectives of adult learning theory. The research project was designed as a quasi- experimental, mixed-methods study. In this article, quantitative survey data were taken as the point of departure, and qualitative data were used for the purpose of analyzing aspects of learning. An educative research intervention may support a trans- formative learning quality when the manager and employees have to deal with severe difficulties, and they succeed in doing so by sharing responsibilities and having the strength to engage in the development process in the workplace. It is possible to support transformative learning in the workplace through an educative research intervention that encourages managers to educate themselves and their employees to think and act in new ways, aiming at integrated autonomy, increased interaction, and learning.

A qualitative study was undertaken by McRae (2015) that explored the conditions for transformative learning in cooperative education as a form of work-integrated learning (WIL), towards the development of a theoretical model. Four case studies were analyzed based on interviews with WIL students, supervisors and their co-op coordinator. The findings revealed that the enablers most involved in contributing to transformative learning were: opportunities for work and learning, a supportive environment, student capabilities, co-workers, supervisors, and assessment and reflection practices. Furthermore, the integration of these transformative outcomes into the WIL academic program or workplace was dependent upon the time and value given to transformative processes, institutional requirements and a positive emotional environment. The implications of these findings are that WIL theoretical models include considerations of: perspective, socio-cultural context, dialectic and mediated processes, time and creating a positive emotional space to support the critical reflection necessary for transformative learning outcomes. Furthermore, adopting a view of WIL as an interaction between two systems opens up possibilities for innovation and renewal in our WIL programs and workplaces. (Asia-Pacific Journal of Cooperative Education, Special Issue, 2015, 16(2), 137-144)

The purpose of the study conducted Kwon et al., (2021) was to assess the validity and reliability of the Transformative Learning Outcomes and Processes Survey (TROPOS) in the workplace context. The results of a confirmatory factor analysis of the data gathered from 132 employees of a steel manufacturing company in the United States have shown that the TROPOS is an appropriate instrument for measuring transformative learning in the workplace context. Implications for transformative learning research and practice will be discussed.

Research Design

Based on the researcher's research objectives, the researcher will adopt a mixed research design, combining quantitative and qualitative methods. This design will allow the researcher to gain a more comprehensive understanding of the transformative learning processes and outcomes, as well as their relationships with other variables Cox (2017). The researcher plans to first use quantitative methods, such as surveys, to quantify individuals'

perceptions of psychological safety, social support, attitude toward uncertainty, and criticality, as well as their transformative learning outcomes Edmondson (1999); Cox (2017). Then, the researcher will use qualitative methods, such as interviews or focus group discussions, to explore participants' experiences, perspectives, and feelings, as well as key factors in the transformative learning process (Cox, 2017).

This mixed research design helps the researcher establish connections between quantitative and qualitative data, leading to a more comprehensive understanding of the research question Creswell & Clark (2018). Quantitative data will provide quantitative descriptions of overall trends and relationships, while qualitative data will provide a deeper understanding of participants' experiences and feelings Creswell & Clark (2018). By combining both methods, the researcher will gain more comprehensive and in-depth insights, making the research findings more persuasive and reliable (Creswell & Plano Clark, 2018).

Respondents of the Study

In this study, the focus is primarily on small and medium-sized technology companies in Beijing. Invitations were extended to 50 companies with whom there was business engagement, and positive responses were received from 34 of them. Subsequently, the researcher requested employee lists from these 34 companies, resulting in a comprehensive population dataset of 19,791 employees. To determine the appropriate sample size, raosoft calculator was utilized, with a margin of error set at 5%, a confidence level of 95%, a total population of 19,791, and a response distribution of 50%. According to the calculations, a sample size of 377 was determined. This was enabled the researcher to obtain reliable research outcomes and gain a comprehensive understanding of the situation of small and medium-sized technology companies in Beijing. The researcher numbered all employees and used software to randomly select 377 numbers. The researcher invited these 377 employees to fill out a questionnaire. The questionnaire was set to be submitted only after all options were filled in.

Data Gathering Procedure

The researcher personally gave an invitation to fill out the questionnaire to 377 randomly selected employees, along with a brief letter of introduction. They were first informed of the purpose of the study and assured of the confidentiality of their responses. During the answering process, the respondents encountered challenges because of an unfamiliar word therefore, the researcher encouraged and explained the meaning of these words for better understanding. Each respondent spent an average of five (5) to ten (10) minutes completing responses to the presented questionnaire. For the respondents that had not responded within three day, a corresponding number of employees has been randomly selected from the classification box based on their nature, and a questionnaire is sent until the number of responses met the sample size standard.

Responses were collected through survey questionnaires, and a total of 377 questionnaire responses were collected. The researcher tabulated, interpreted, and analyzed the data in coding sheets that prepared calculations. Once the responses were tallied, it was submitted to the statistician immediately. Experts use statistical processing to determine the reliable results of a study. The results were used to construct verbal explanations and recommendations to achieve the study objectives. Respondents' responses corroborated the analysis of the questionnaire data.

Results and Discussion

1. **Profile of the Respondents**

Age	Frequency	Percentage
Below 25 years old	21	5.57
25 -34 years	90	23.87
35 – 44 years	256	67.90
Over 45 years old	10	2.65
Total	**377**	**100**

Table 1. Distribution of Respondents by Age

The table demonstrates the distribution of respondents' age. The majority of respondents fall within the 35 to 44 age group, indicating a high representation with 67.90%. This is followed by the 25 to 34 age group, which shows a moderate representation with 23.87%. On the other hand, respondents below 25 years old and over 45 years old are relatively fewer, indicating low representation with 5.57% and very low representation with 2.65%. This suggests that the middle-aged group dominates among the respondents, reflecting the general talent structure in the information technology field.

Sex	Frequency	Percentage
Male	154	40.85

Female	223	59.15
Total	**377**	**100**

Table 2. Distribution of Respondents by Sex

The table presents the distribution of respondents' sex. The number of female respondents (223, 59.15%) is significantly higher than that of male respondents (154, 40.85%). This indicates a higher proportion of females among the respondents, possibly reflecting a larger representation of women in the field.

Educational Attainment	**Frequency**	**Percentage**
College - below	33	8.75
Bachelor's Degree	65	17.24
Master's Degree	156	41.38
Doctorate Degree	123	32.63
Total	**377**	**100**

Table 3. Distribution of Respondents by Educational Attainment

The table depicts the distribution of respondents' educational attainment. The highest number of respondents holds a Master's degree (156, 41.38%), followed by those with a Doctorate degree (123, 32.63%). Bachelor's degree (65, 17.24%) and individuals with education below college level (33, 8.75%) are comparatively fewer. This suggests that the majority of respondents have achieved higher levels of education, with Master's and Doctorate degrees being the most prevalent.

Years in IT	**Frequency**	**Percentage**
Below 5 years	166	44.03
5 – 10 years	99	26.26
11 – 15 years	22	5.84
16 – 20 years	90	23.87
21 – 30 years	0	0.00
30 years and above	0	0.00
Total	**377**	**100**

Table 4. Distribution of Respondents by Years in IT

The table presents the distribution of respondents' years of experience in the field of Information Technology (IT). The majority of respondents have below 5 years of experience (166, 44.03%), followed by those with 16 – 20 years of experience (90, 23.87%). The percentage decrease for individuals with 5 – 10 years of experience (99, 26.26%) and 11 – 15 years of experience (22, 5.84%). No respondents reported having 21 – 30 years of experience or 30 years and above. This suggests a relatively young workforce in the IT field, with a significant number of individuals having less than 5 years of experience.

2. **Level of Respondents' Psychological Safety**

Psychological Safety	**Mean**	**Interpretation**
1. If you make a mistake on this team, it is often held against you.	3.58	Average
2. Members of this team are able to bring up problems and tough issues.	3.63	Average
3. People on this team sometimes reject others for being different.	3.70	Average
4. It is safe to take a risk on this team.	3.62	Average
5. It is difficult to ask other members of this team for help.	3.57	Average
6. No one on this team would deliberately act in a way that undermines	3.63	Average

my efforts.		
7. Working with members of this team, my unique skills and talents are valued and utilized.	3.67	Average
Composite Mean	**3.63**	**Average**

Table 5. Level of Psychological Safety

As shown in table 7, the overall composite mean for psychological safety is 3.63 and interpreted as average meaning the psychological safety of the respondents are in average level and balanced.

The table shows people on the team sometimes reject others for being different has the highest weighted mean of 3.70 and interpreted as average. Working with members of the team, having a unique skills and talents are valued and utilized got the second highest weighted mean of 3.67 and interpreted as average. Lastly, members of the team are able to bring up problems and tough issues and no one on the team would deliberately act in a way that undermines my efforts, both got the third highest weighted mean of 3.63 and interpreted as average as well.

Items or statements with higher averages suggest areas where the team performs well. For instance, members feel comfortable raising problems and difficult issues, indicating an environment that is supportive and open to communication (Edmondson, 2018). Additionally, individuals feel that their unique skills and talents are valued and utilized within the team, reflecting a culture that encourages members to contribute their strengths (Carmeli et al., 2012).

On the other hand, the table shows it is difficult to ask other members of the team for help got the lowest weighted mean of 3.57 and interpreted as average. The second lowest weighted mean with 3.58 and interpreted as average is the statement that if someone make a mistake on the team, it is often held against to the person. The statement that it is safe to take a risk on the team is the third lowest weighted mean of 3.62 and interpreted as average.

However, attention should also be paid to items or statements with lower averages. For example, if mistakes are often held against team members, it may indicate a punitive response within the team, affecting members' confidence and willingness to take risks (Edmondson, 2018). Similarly, instances where team members reject others for being different may suggest the presence of exclusion or discrimination within the team, potentially impacting team cohesion and collaboration (Carmeli et al., 2012).

Therefore, while the team's overall psychological safety is neutral, it is essential to address areas of concern and take measures to improve the team's psychological safety climate, fostering trust among members and enhancing teamwork and performance.

3. **The transformative learning process of the respondents measured in terms of:**
   Social Support;

Social Support	Mean	Interpretation
1. My colleagues often make an effort to understand my perspective.	3.98	Average
2. I usually feel safe sharing my opinions.	3.81	Average
3. I can raise questions about my colleagues' beliefs without fear of being shut out.	3.87	Average
4. My colleagues and I support one another.	3.88	Average
5. Group discussions are usually inclusive of differing perspectives.	3.81	Average
6. I trust my colleagues.	3.93	Average
7. My colleagues and I respect one another.	3.66	Average
8. I feel it is safe to participate in the group as my authentic self.	3.69	Average
Composite Mean	**3.83**	**Average**

Table 6. Assessment on Transformative Learning Process in terms of Social Support

The table shows the composite mean for social support of 3.83 indicates that the level of social support within the group is average. This suggests a balanced environment where neither high nor low levels of social support are prevalent.

The table shows that colleagues often make an effort to understand every perspective got the highest weighted mean of 3.98 and interpreted as average. Trusting colleagues got the second highest weighted mean of 3.93 and interpreted as average. Supporting one another is the third highest weighted mean of 3.88 and interpreted as average.

Items with higher averages indicate areas where the group excels in providing social support. For example, colleagues making an effort to understand each other's perspectives and the feeling of safety in sharing opinions suggest an environment conducive to open communication and mutual understanding.

The table above shows that respecting one another got the lowest weighted mean of 3.66 and interpreted as average. It is safe to participate in a group being an authentic perspective got the second lowest weighted mean of 3.69 and interpreted as average. Group discussions are usually inclusive of differing perspectives and sharing an opinion feels safe, both statements got the third lowest weighted mean of 3.81 and both interpreted as average.

However, attention should also be paid to items with lower averages. For instance, lower scores on feeling safe to participate as one's authentic self or feeling respected by colleagues may indicate areas where improvements in social support are needed.

Attitude towards Uncertainty;

The overall weighted mean of 3.88 suggests an average stance towards uncertainty within the group. This indicates a balanced attitude where neither excessive aversion nor excessive acceptance of uncertainty is prevalent.

The table shows that employees often feel hesitant in what they believed to be true got the highest weighted mean of 4.03 and interpreted as average. Employee find discomfort could be an important part of learning got the second highest weighted mean of 4.02 and interpreted as average. Employee of often feel surprised by what they learned got the third highest weighted mean of 3.93 and interpreted as average.

Attitude toward Uncertainty	Mean	Interpretation
1. I feel comfortable suspending my judgment.	3.92	Average
2. I am open to new possibilities.	3.91	Average
3. I often feel hesitant in what I believed to be true.	4.03	Average
4. I benefit from suspending my judgment.	3.80	Average
5. I often feel surprised by what I learned.	3.93	Average
6. I find discomfort could be an important part of learning.	4.02	Average
7. I find stepping outside my comfort zone helps me learn.	3.73	Average
8. I often feel uncertain about my beliefs.	3.71	Average
Composite Mean	**3.88**	**Average**

Table 7. Assessment on Transformative Learning Process in terms of Attitude towards Uncertainty

Items with higher averages highlight aspects where the group demonstrates a positive attitude toward uncertainty. For instance, feeling comfortable suspending judgment, being open to new possibilities, and finding discomfort as an important part of learning suggest a willingness to embrace uncertainty as a catalyst for growth and learning.

On the other hand, the table above shows that employee often feel uncertain about their beliefs got the lowest weighted mean of 3.71 and interpreted as average. Employee find stepping outside their comfort zone helps them learn got the second lowest weighted mean of 3.73 and interpreted as average. Employee benefit from suspending their judgment got the third lowest weighted mean of 3.80 and interpreted as average.

Conversely, attention should be directed to items with lower averages, indicating potential areas for improvement in embracing uncertainty. For instance, feeling uncertain about one's beliefs or hesitant in what one believed to be true may suggest a reluctance to confront or explore uncertainty.

In summary, while the group's overall attitude toward uncertainty is neutral, there are opportunities to foster a more proactive and positive approach to uncertainty, which could enhance learning and adaptation within the group.

Criticality

Criticality	Mean	Interpretation
1. I am willing to explore ideas I disagree with.	3.98	Average
2. I discover contradictions in my beliefs.	3.96	Average
3. I challenge my own beliefs.	4.31	Average
4. I challenge my colleagues' beliefs.	4.08	Average
5. My colleagues raise questions about my beliefs.	3.93	Average
6. I explore new ways to think about my beliefs.	4.34	Average
7. Disagreements help me understand my beliefs.	4.36	Average
Composite Mean	**4.14**	**Average**

Table 8. Assessment on Transformative Learning Process in terms of Criticality

The overall weighted mean of 4.14 suggests an average level of criticality within the transformative learning process. This indicates a balanced attitude towards critical thinking, neither excessively critical nor lacking criticality.

The table shows that disagreements help employee understand their beliefs got the highest weighted mean of 4.36 and interpreted as average. Employee explore new ways to think about their beliefs got the second highest weighted mean of 4.34 and interpreted as average. Employee challenge their own beliefs got the third highest weighted mean of 4.31 and interpreted as average.

Items with higher averages indicate aspects where individuals demonstrate a strong inclination towards critical thinking. For example, individuals express a willingness to explore ideas they disagree with, challenge their own beliefs, and explore new perspectives. These behaviors suggest an active engagement in critical reflection and openness to learning.

On the other hand, table above shows that colleagues raise questions about the beliefs of each employee got the lowest weighted mean of 3.93 and interpreted as average. Employee discover contradictions in their beliefs got the second lowest weighted mean of 3.96 and interpreted as average. Employees are willing to explore ideas they disagree with got the third lowest weighted mean of 3.98 and interpreted as average.

Conversely, items with lower averages may indicate areas where criticality could be further developed. For instance, lower scores on challenging colleagues' beliefs or colleagues raising questions about one's beliefs may suggest a lack of robust dialogue or debate within the group.

In summary, while the overall level of criticality within the transformative learning process is neutral, there are opportunities to further cultivate critical thinking skills and promote a culture of robust inquiry and debate, which could enhance the transformative learning experience.

4. **Assessment on Transformative Learning Outcome**

Transformative Learning Outcomes	Mean	Interpretation
1. My deeply held beliefs about work changed.	4.01	Average
2. I developed a greater sense of responsibility toward others.	3.75	Average
3. I changed my professional goals for the future.	3.88	Average
4. I made major changes in my professional life.	3.68	Average
5. My view of myself as a professional changed.	3.82	Average
6. My view of the workplace changed.	3.99	Average
7. Opportunities at work changed my professional life.	3.90	Average
Composite Mean	**3.86**	**Average**

Table 9. Assessment on Transformative Learning Outcome

The overall weighted mean of 3.86 indicates an average level of transformative learning outcomes. This suggests that overall, the transformative learning process has not resulted in significant changes in beliefs or behaviors.

The table shows that employee deeply held beliefs about work changed got the highest weighted mean of 4.01 and interpreted as average. Employee's view of the workplace changed got the second highest weighted mean of 3.99 and interpreted as average. Opportunities at work changed their professional life got the third highest weighted mean of 3.90 and interpreted as average.

Items with higher averages indicate relatively strong transformative learning outcomes in certain aspects. For example, significant changes in work-related beliefs, shifts in perceptions of oneself as a professional, and alterations in views of the workplace suggest substantial transformations in perception and understanding (Taylor, 2008; Dirkx, 2012).

On the other hand, the table above shows that employees changed their professional goals for the future got the lowest weighted mean of 3.68 and interpreted as average. Employees developed a greater sense of responsibility toward others got the second lowest weighted mean of 3.75 and interpreted as average. Employees view of themselves as a professional changed got the third lowest weighted mean of 3.82 and interpreted as average.

However, lower item averages may indicate shortcomings in some transformative learning outcomes. For instance, lower scores on developing a greater sense of responsibility towards others or making major changes in professional life may suggest that transformative learning outcomes were less pronounced in these areas (Cranton, 2016; King, 2012).

5. **Effect of Psychological Safety on Transformative Learning Outcomes when Transformative Learning Process Mediates**
   Social Support;

Social Support	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	1.903	0.154	12.355	<0.001	Reject	Significant
Psychological Safety	0.531	0.041	13.027	<0.001	Reject	Significant Effect

Model Summary: R = 0.558; R^2 = 0.312
Regression Model: F = 169.708;   p = <0.001

Table 10. Effect of Psychological Safety on Social Support

For every one-unit increase in psychological safety, the predicted value of transformative learning outcomes increases by approximately 0.531 units. The coefficient for psychological safety is statistically significant ($p < 0.001$), indicating a significant positive effect on transformative learning outcomes.

The multiple correlation coefficient (R) is 0.558, indicating a moderate relationship between the independent and dependent variables. The coefficient of determination (R^2) is 0.312, suggesting that 31.2% of the variance in transformative learning outcomes can be explained by psychological safety and social support.

The F-value is 169.708, with a p-value of less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings underscore the importance of psychological safety in fostering social support within organizational contexts. Previous research has consistently highlighted the role of psychological safety in promoting positive social dynamics and team cohesion (Edmondson, 1999; Walumbwa & Schaubroeck, 2009), corroborating the significance of the current results.

The multiple correlation coefficient (R) is 0.692, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R^2) is 0.479, suggesting that 47.9% of the variance in transformative learning outcomes can be explained by social support.

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.967	0.161	6.004	<0.001	Reject	Significant
Social Support	0.755	0.041	18.567	<0.001	Reject	Significant Effect

Model Summary: R = 0.692; R^2 = 0.479
Regression Model: F = 344.739; p = <0.001

Table 11. Effect of Social Support on Transformative Learning Outcomes

The F-value is 344.739, with a p-value of less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings highlight the importance of social support in promoting positive transformative learning outcomes. Previous research has consistently emphasized the beneficial effects of social support on individual learning and development (Cox, 2017; Nembhard & Edmondson, 2006), corroborating the significance of the current results.

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.630	0.167	3.768	<0.001	Reject	Significant
Psychological Safety	0.244	0.045	5.430	<0.001	Reject	Significant Effect
Social Support	0.612	0.047	12.949	<0.001	Reject	Significant Effect

Model Summary: R = 0.719; R^2 = 0.517
Regression Model: F = 200.204; p = <0.001

Table 11. Multiple mediating effects on transforming learning outcomes - Social Support

When both psychological safety and social support are zero, the predicted value of transformative learning outcomes is approximately 0.630. The constant term is statistically significant ($p < 0.001$), indicating that transformative learning outcomes exist even in the absence of psychological safety and social support.

For every one-unit increase in psychological safety, the predicted value of transformative learning outcomes increases by approximately 0.244 units. The coefficient for psychological safety is statistically significant ($p < 0.001$), indicating a significant positive effect on transformative learning outcomes.

For every one-unit increase in social support, the predicted value of transformative learning outcomes increases by approximately 0.612 units. The coefficient for social support is statistically significant ($p < 0.001$), indicating a significant positive effect on transformative learning outcomes.

The multiple correlation coefficient (R) is 0.719, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R^2) is 0.517, suggesting that 51.7% of the variance in transformative learning outcomes can be explained by psychological safety and social support.

The F-value is 200.204, with a p-value of less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings underscore the importance of fostering both psychological safety and social support in educational or organizational settings to enhance transformative learning outcomes. Prior research has also highlighted the significant contributions of psychological safety and social support to individual growth and development (Edmondson, 1999; Walumbwa & Schaubroeck, 2009; Cox, 2017), further supporting the validity of the current results.

Attitude towards Uncertainty;

Attitude towards uncertainty	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	1.823	0.134	13.558	<0.001	Reject	Significant
Psychological Safety	0.567	0.036	15.934	<0.001	Reject	Significant Effect

Model Summary: R = 0.635; R^2 = 0.404
Regression Model: F = 253.899; p = <0.001

Table 12. Effect of Psychological Safety on Attitude Towards Uncertainty

When psychological safety is zero, the predicted value of attitude towards uncertainty is approximately 1.823. The constant term is significant statistically (p < 0.001), indicating that even in the absence of psychological safety, attitude towards uncertainty still exists.

For each unit increase in psychological safety, the predicted value of attitude towards uncertainty increases by approximately 0.567 units. The coefficient for psychological safety is significant statistically (p < 0.001), suggesting a significant positive impact on attitude towards uncertainty.

The multiple correlation coefficient (R) is 0.635, indicating a moderate relationship between the independent and dependent variables. The coefficient of determination (R2) is 0.404, indicating that psychological safety explains 40.4% of the variance in attitude towards uncertainty.

The F-value is 253.899, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict attitude towards uncertainty.

These results underscore the importance of psychological safety in shaping individuals' attitudes towards uncertainty, highlighting its role in promoting openness to ambiguity and novel experiences. This finding aligns with prior research emphasizing the influence of psychological safety on individuals' willingness to embrace uncertainty (Edmondson, 1999; Newman et al., 2017).

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.476	0.159	2.998	0.003	Reject	Significant
Attitude Towards Uncertainty	0.872	0.040	21.923	<0.001	Reject	Significant Effect

Model Summary: R = 0.749; R^2 = 0.562
Regression Model: F = 480.609; p = <0.001

Table 13. Effect of Attitude Towards Uncertainty on Transformative Learning Outcomes

When attitude towards uncertainty is zero, the predicted value of transformative learning outcomes is approximately 0.476. The constant term is significant statistically (p = 0.003), indicating that even with the lowest level of attitude towards uncertainty, transformative learning outcomes still exist.

For each unit increase in attitude towards uncertainty, the predicted value of transformative learning outcomes increases by approximately 0.872 units. The coefficient for attitude towards uncertainty is significant statistically (p < 0.001), suggesting a significant positive impact on transformative learning outcomes.

The multiple correlation coefficient (R) is 0.749, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R2) is 0.562, indicating that attitude towards uncertainty explains 56.2% of the variance in transformative learning outcomes.

The F-value is 480.609, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings underscore the importance of fostering a positive attitude towards uncertainty in facilitating transformative learning outcomes among individuals. Prior research has consistently emphasized the role of attitude towards uncertainty in promoting adaptive behaviors and learning outcomes (Boekaerts & Cascallar, 2006; Dweck, 2008), supporting the significance of the current results.

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.368	0.162	2.266	0.024	Reject	Significant
Psychological Safety	0.125	0.046	2.751	0.006	Reject	Significant Effect

Table 14. Multiple mediating effects on transforming learning outcomes - Attitude Towards Uncertainty

When both psychological safety and attitude towards uncertainty are zero, the predicted value of transformative learning outcomes is approximately 0.368. The constant term is significant statistically (p = 0.024), indicating that even with the lowest levels of psychological safety and attitude towards uncertainty, transformative learning outcomes still exist.
For each unit increase in psychological safety, the predicted value of transformative learning outcomes increases by approximately 0.125 units. The coefficient for psychological safety is significant statistically (p = 0.006), suggesting a significant positive impact on transformative learning outcomes.
For each unit increase in attitude towards uncertainty, the predicted value of transformative learning outcomes increases by approximately 0.783 units. The coefficient for attitude towards uncertainty is significant statistically (p < 0.001), suggesting a significant positive impact on transformative learning outcomes.
The multiple correlation coefficient (R) is 0.755, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R2) is 0.570, indicating that psychological safety and attitude towards uncertainty together explain 57.0% of the variance in transformative learning outcomes.
The F-value is 248.296, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.
These findings underscore the importance of both psychological safety and attitude towards uncertainty in promoting transformative learning outcomes among individuals. Prior research has highlighted the significant impact of these factors on learning processes and outcomes (Edmondson, 1999; Boekaerts & Cascallar, 2006; Dweck, 2008), supporting the validity of the current results

Criticality

Criticality	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	1.859	0.163	11.404	<0.001	Reject	Significant
Psychological Safety	0.628	0.043	14.565	<0.001	Reject	Significant Effect

Model Summary: R = 0.601; R² = 0.361
Regression Model: F = 212.126; p = <0.001

Table 15. Effect of Psychological Safety on Criticality

When psychological safety is zero, the predicted value of criticality is approximately 1.859. The constant term is significant statistically (p < 0.001), indicating that even in the absence of psychological safety, criticality still exists.
For each unit increase in psychological safety, the predicted value of criticality increases by approximately 0.628 units. The coefficient for psychological safety is significant statistically (p < 0.001), suggesting a significant positive impact on criticality.
The multiple correlation coefficient (R) is 0.601, indicating a moderate relationship between the independent and dependent variables. The coefficient of determination (R2) is 0.361, indicating that psychological safety explains 36.1% of the variance in criticality.
The F-value is 212.126, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict criticality.
These findings are consistent with prior research that has highlighted the importance of psychological safety in fostering critical thinking skills and promoting learning outcomes (Edmondson, 1999; Kahn, Barton, & Fellows, 2013; Carmeli & Gittell, 2009), supporting the validity of the current results

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.943	0.155	6.090	<0.001	Reject	Significant
Criticality	0.705	0.036	19.502	<0.001	Reject	Significant Effect

Model Summary: R = 0.710; R² = 0.504
Regression Model: F = 380.334; p = <0.001

Table 16. Effect of Criticality on Transformative Learning Outcomes

When criticality is zero, the predicted value of transformative learning outcomes is approximately 0.943. The constant term is significant statistically ($p < 0.001$), indicating that even with the lowest level of criticality, transformative learning outcomes still exist.

For each unit increase in criticality, the predicted value of transformative learning outcomes increases by approximately 0.705 units. The coefficient for criticality is significant statistically ($p < 0.001$), suggesting a significant positive impact on transformative learning outcomes.

The multiple correlation coefficient (R) is 0.710, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R^2) is 0.504, indicating that criticality explains 50.4% of the variance in transformative learning outcomes.

The F-value is 380.334, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings align with prior research highlighting the importance of critical thinking in promoting transformative learning (Mezirow, 1991; King & Kitchener, 2004; Brookfield, 2015), providing support for the validity of the current results.

Transformative Learning Outcomes	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	0.696	0.162	4.297	<0.001	Reject	Significant
Psychological Safety	0.198	0.046	4.280	<0.001	Reject	Significant Effect
Criticality	0.591	0.044	13.369	<0.001	Reject	Significant Effect

Model Summary: R = 0.726; R^2 = 0.527
Regression Model: F = 208.107; p = <0.001

Table 17. Multiple mediating effects on transforming learning outcomes – Criticality

When both psychological safety and criticality are zero, the predicted value of transformative learning outcomes is approximately 0.696. The constant term is significant statistically ($p < 0.001$), indicating that even with the lowest levels of psychological safety and criticality, transformative learning outcomes still exist.

For each unit increase in psychological safety, the predicted value of transformative learning outcomes increases by approximately 0.198 units. The coefficient for psychological safety is significant statistically ($p < 0.001$), suggesting a significant positive impact on transformative learning outcomes.

For each unit increase in criticality, the predicted value of transformative learning outcomes increases by approximately 0.591 units. The coefficient for criticality is significant statistically ($p < 0.001$), suggesting a significant positive impact on transformative learning outcomes.

The multiple correlation coefficient (R) is 0.726, indicating a strong relationship between the independent and dependent variables. The coefficient of determination (R^2) is 0.527, indicating that psychological safety and criticality together explain 52.7% of the variance in transformative learning outcomes.

The F-value is 208.107, with a p-value less than 0.001, indicating that the regression model is statistically significant and can be used to predict transformative learning outcomes.

These findings align with existing literature on transformative learning, which emphasizes the significance of psychological safety and critical thinking in fostering positive learning outcomes (Mezirow, 1991; King & Kitchener, 2004; Brookfield, 2015). Thus, the results provide empirical support for the theoretical frameworks underpinning transformative learning processes.

CONCLUSIONS

Based on the findings, the following conclusions were drawn:
1. The majority of employees surveyed fall within the age group of 25-34 years, indicating a relatively younger workforce in the sampled small and medium-sized companies in Beijing.
2. The composite mean score for transformative learning outcomes suggests a moderate level of transformative learning among employees in the studied organizations.
3. Employees perceive a moderate level of psychological safety in their work environment, as indicated by the composite mean score for psychological safety.
4. Transformative learning processes, including social support, attitude toward uncertainty, and criticality, play significant roles in shaping employees' transformative learning experiences, as evidenced by their respective composite mean scores.
5. The mediation analysis indicates that transformative learning processes significantly mediate the relationship between psychological safety and transformative learning outcomes, emphasizing the role of these processes as mechanisms through which psychological safety influences employee learning.

6. Significant differences in assessments based on demographic profiles suggest that age, sex, educational attainment, and years in IT are important factors to consider when designing learning interventions or organizational policies aimed at enhancing employee development.
7. The proposed transformative learning plan are sought to enhance the transformative learning outcomes of small and medium – sized technology companies in Beijing, China.

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