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Improving IT communicative competence among first-year students of a Polytechnic in Beijing through ODI

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Abstract

This research aimed to improve IT communicative competence among first-year students of a Polytechnic in Beijing through Organization Development Intervention (ODI). The researcher established the conceptual framework based on the preliminary diagnosis and previous theoretical frameworks. The sample is 42 first-year students majoring in Computer Network Technology (CNT) at Beijing Polytechnic. The researcher conducted ODIs with participants from June to July in the spring semester of 2023, a total of two months. Appreciate Inquiry (AI), Goal Setting, Team Building, and Career Planning and Development were the intervention techniques in the action research framework. Mixed research methods were adopted to collect and analyze the data and test research hypotheses. The quantitative part included survey questionnaires in pre- and post-ODI stages, while the qualitative approach included interviews, classroom observations, and reflection reports of ODI. The quantitative finding indicated that student cognitive flexibility, learning motivation, and communicative competence were significantly improved after ODI. Based on the qualitative analysis, students had an increased level in self-confidence and willingness to communicate expression after the ODIs. Students were more likely to agree that the school had a goal for future success and a strategy to achieve it. Also, they believed participating in organizational development practices would improve their skills, and they further learned the importance of social skills, such as communication, for future careers. In conclusion, the findings suggest practical recommendations for enhancing cognitive flexibility, learning motivation, and communicative competence in IT professional courses to sustain students' momentum.

Keywords: organization development intervention, communicative competence, self-efficacy, learning motivation, cognitive flexibility, social interaction, appreciative inquiry

Introduction

Strengthening the employability of college graduates has attracted attention from all walks of life. Governments, institutions of higher learning, and associations in many countries have begun to take measures to help college graduates find employment effectively. The ability of an individual to get and maintain a job is called employability, and people can learn to acquire this ability or skill (Succi & Canovi, 2020). Tran (2012) believes that communication ability is a skill that affects employability. Meanwhile, studies by other scholars show that employers value the communication ability of graduates more than technical ability, and the important factors affecting successful employment include general ability and communication ability (Robles, 2012). With the close international exchanges and the development of international trade, employers are more in need of talents with stronger communication skills and interpersonal awareness (Cheruvelil et al., 2014; Stewart et al., 2016).

Promoting teaching management is necessary to develop employability on a university campus. According to the characteristics of students in different stages, majors, and other situations, different content and levels of ability development activities are carried out (Jackson, 2015; Liu et al., 2020). The "employment gap" problem is becoming increasingly prominent in current employment (Liu, 2021). The root cause is a disconnect between the majors and curriculum settings of the faculties and the market (Mulder & Winterton, 2017). The university pays attention to teaching professional knowledge and lacks a systematic approach to the occupational concepts, knowledge, methods, and professional skills required for employment. The actual cause of college students' employment difficulties is precisely the lack of college students' employability (Xia et al., 2020).

According to the preliminary diagnosis, SWOT analysis, and the analysis with the STAR Model, five significant problems were identified for the Information Technology major Students in STE at Beijing Polytechnic: low communication and Expression Ability, low self-efficacy, low cognitive flexibility, low social interaction, and low learning motivation. The researcher consulted the employment quality reports of college students in major vocational colleges and regions, the relevant literature on employability, and the analysis of research reports. Moreover, the researcher conducted consultations and interviews with business managers, outstanding graduates, and stakeholders (Professors/Instructors and students from STE who were involved in this current research) and found that communication skills, cognitive flexibility, social interaction, self-efficacy, and learning motivation are critical. They have significant correlations with the development of students' employability, employment prospects, and the turnover rate within six months after employment (Beijing Polytechnic, 2019). The development of employability is related to the core mission of all vocational colleges, including Beijing Polytechnic. Suppose these two problems are not fully and effectively solved. In that case, it will affect the quality of student training and employment level and hinder the organizational development of Beijing Polytechnic.

Therefore, the research objectives are (1) to investigate the current situation of Information Technology (IT) major Students' cognitive flexibility (CF), social interaction (SI), self-efficacy (SE), learning motivation (LM), and communicative competence (CC) in School of Telecommunications Engineering (STE) at Beijing Polytechnic. (2) to design and implement appropriate ODIs to enhance Information Technology major Students' cognitive flexibility,

social interaction, self-efficacy, learning motivation, and communicative competence in STE. (3) to determine students' cognitive flexibility differences between pre- and post-ODI. (4) to determine students' social interaction differences between pre- and post-ODI. (5) determine the differences in students' self-efficacy between pre- and post-ODI. (6) to determine students' learning motivation differences between pre- and post-ODI. Finally, (7) to determine the differences in students' communicative competence between pre- and post-ODI.

Literature Review

Learning Motivation (LM)

Learning motivation refers to the mental process that motivates and orients. It sustains learning behavior, indicating whether the learner wants to know, what he is willing to learn, and the degree of learning effort (Xie, 2011). The researcher adapted M. Keller's ARCS model of motivational design for the current research.

The setting is an information technology major specialized course classroom. The four components are defined as follows: **Attention** refers to the fact that students can consciously and selectively pay attention to the learning content and have an interest and positive desire to explore the learning objectives and scope. **Relevance** refers to the learning objectives and contents that meet the objective needs of students, conform to the current cognitive structure and cognitive development level of students, can be linked with the existing experience, and have a specific value for students' future development. **Confidence** refers to the fact that students have the corresponding knowledge and experience preparing for the learning objectives they want to achieve and the learning situations they face and have the belief to achieve the expected learning objectives. **Satisfaction** refers to the learning results meeting the students' expectations and having a positive effect. It is an essential factor in maintaining learning motivation.

Self-Efficacy (SE)

Bandura defines self-efficacy as a belief in one’s capabilities to organize and execute the course of action required to attain a goal (Bandura, 1997). In this current research, Self-efficacy refers to a broad and stable sense of personal competence to deal effectively with stressful situations. It reflects a generalization across multiple domains of functioning in which students judge how productive they are. The researcher adapted Bandura's research on self-efficacy for the current research.

The setting is an information technology major specialized course classroom. The four components are defined as follows: **Performance accomplishment** refers to the successful experience student’s gain in classroom teaching, which is crucial for them to achieve more outstanding achievements in the future. **Vicarious Experience** refers to when students see others like themselves succeed through continuous efforts; the perception is that they will also believe they can succeed. **Verbal Persuasion** refers to when students receive it from others and feel that they have the ability to complete tasks and work; they are more likely to invest more effort and perseverance to persevere, especially when they begin to feel complicated or suspect themselves, the role of social Persuasion is more prominent. **Emotional Arousal** refers to the influence of emotion and physiological state on the formation of students' self-efficacy; when

they evaluate their ability, they often rely on their physical and emotional feelings at that time, and emotion will also affect the judgment of their ability.

Cognitive Flexibility (CF)

Cognitive flexibility refers to students making meaningful and flexible emotional choices to adapt to the external environment and competition (Martin & Rubin, 2011). In this current research, cognitive flexibility refers to the cognizance of the diversity of technical communication jobs. The researcher adapted Martin's research on cognitive flexibility for the current research.

The setting is an information technology major specialized course classroom. The three components are defined as follows: **Awareness** refers to the awareness of first-year IT major students that options and alternatives are available in any given situation. **Willingness** refers to the willingness of first-year IT major students to be flexible and adapt to the situation. **Belief** refers to the self-efficacy of first-year IT major students in being flexible.

Social Interaction (SI)

Social interaction refers to all the processes in which multiple people react and stimulate each other. In this current study, Social interaction refers to the process of interaction between individuals and groups, in which students are constantly aware of the impact of their behaviors on others and the whole, and the expectations of others will affect students' behaviors. The researcher adapted Lechler's research on social interaction for the current research (Lechler, 2001).

The setting is an information technology major specialized course classroom. It comprises six components: **Communication** refers to information exchange among students within a team or group. The quality of communication depends on the frequency, formalization, structure, and openness of the information exchange. **Cohesion** refers to the degree to which students desire to remain on the team or group. Three pivotal aspects of cohesion are the interpersonal attraction of team members, commitment to the team task, and group pride/team spirit. **Work norms** refer to the expectations within a team or group regarding students' behavior. Norms regarding the effort of students are critical for successful teamwork. **Mutual support** refers to the essential of students to enhance their team spirit. The collaboration of students depends on cooperation rather than competition. **Coordination** refers to organizing the different activities or students involved in something so that they work together effectively. **Conflict resolution** refers to the style with which the students handle rising conflicts and how the team resolves these conflicts before their destructive effects on performance.

Communicative Competence (CC)

Wiemann believed that communicative competence refers to people's ability to choose appropriate communicative behaviors to communicate with others and make them feel appropriate and comfortable when facing different people and specific situations (Wiemann, 1977). The researcher adapted Wiemann's model of Communication Competence for this current research. The most important skills of Communicative Competence are collaboration skills, writing skills, Technical learning and assessment skills, and character assessment skills.

The setting is an information technology major specialized course classroom. The six components are defined as follows: **General competence** refers to the degree of a student's willingness, effectiveness, and appropriateness to conduct interpersonal communication, such as saying the right thing at the right time and dealing with others effectively. **Affirmation/support** refers to the degree to which students feel appropriate for their physical behaviors, physical distance, idioms, and speech speed during communication. **Social relaxation** refers to the degree to which students perceive that posture relaxation behavior, the speed of speaking is too fast, and speech disorders, hesitation, and fluency are caused by tension in communicating with others. **Empathy** refers to the degree to the perception to which students show direct hints, oral expressions, and feelings about the other person's situation when communicating with others. **Behavioral flexibility** refers to the degree to the adaptation of students in the communication process with others, whether the situation changes or not, including direct verbal cues and the alternation and co-occurrence of specific verbal choices that mark the status and subordination of the interactor. **Interaction management** refers to the ability of students to use dialogue programs in social interaction, involving two aspects of building and maintaining interaction, such as the beginning and end of the meeting, the allocation of speaking times, and the control of discussion topics.

The Relationship between students' CF, SI, LM, SE, and CC

In the medical care field, some past literature has indicated that nurses with better functional communication and problem-solving skills also have higher self-efficacy, and their problem-solving process is often problem-oriented (Bong et al., 2009; Im et al., 2012; Merk & Büker, 2013). Park et al. (2015) found that enhanced communication skills can increase self-efficacy and job satisfaction. Developing students' self-efficacy can enhance their ability to communicate in mathematics, and the higher their confidence in advanced mathematics, the higher their communication skills (Rahmi et al., 2017). The stronger the communication ability of college teachers, the higher their sense of self-efficacy; that is to say, communication ability significantly affects self-efficacy, among which communication skills best reflect this correlation. (Chang & Hu, 2017). Communication skills had the highest impact on self-efficacy. In contrast, communication motivation had the lowest effect. The score of the general self-efficacy scale influences the clinical communication ability of new nurses in tumor-specialized hospitals (Yan et al., 2022).

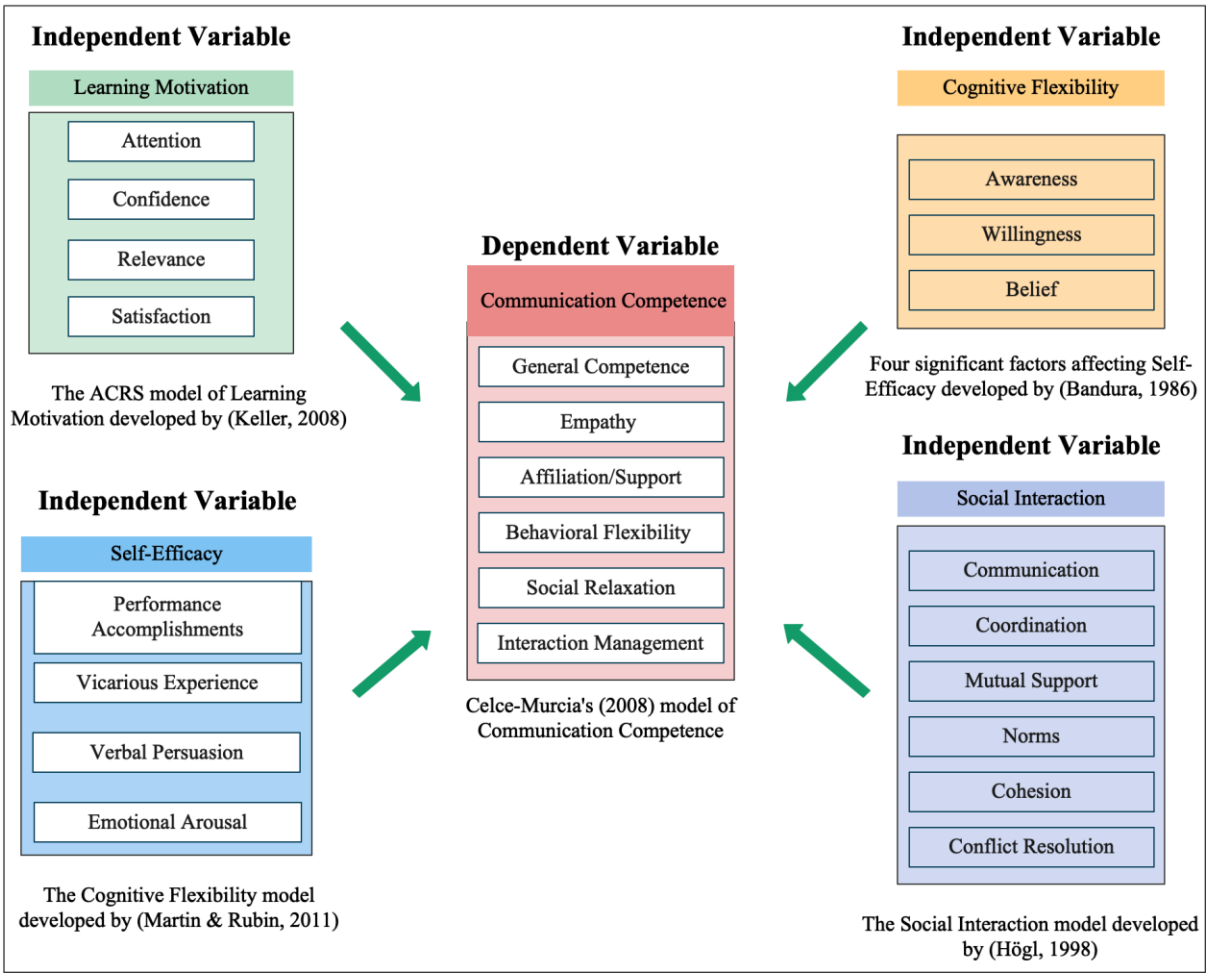
The study of Masgoret and Gardner (2003) shows that a higher level of attitude and a stronger level of motivation can enhance a person's reason for activities and increase the possibility of success in language learning. The research found that motivation can clarify communicative language competence in the learner's foreign languages (Karlak & Velki, 2015). Motivation and learning strategies can significantly predict communicative language competence in a foreign language. Previous research findings also show this point (Djigunović, 2006). Motivation strongly and positively influences communicative competence (Alnatheer, 2013). Without sufficient motivation, learners with the most outstanding abilities cannot accomplish long-term goals (Guilloteaux & Dörnyei, 2008). Participants who scored low in motivation also scored low in communicative competence (Alnatheer, 2013).

The ACRS model of learning motivation, self-determination theory, technical communication competency model, social interaction theory, and social cognitive theory

provide the theoretical framework for the literature review guiding questions. Meanwhile, with the help of these five theories and models, the relationship between learning motivation, self-efficacy, cognitive flexibility, social interaction, and communicative competence is further clarified. Their concepts are critical to this current study, thus being identified as key concepts to define within the theoretical framework.

Figure 1

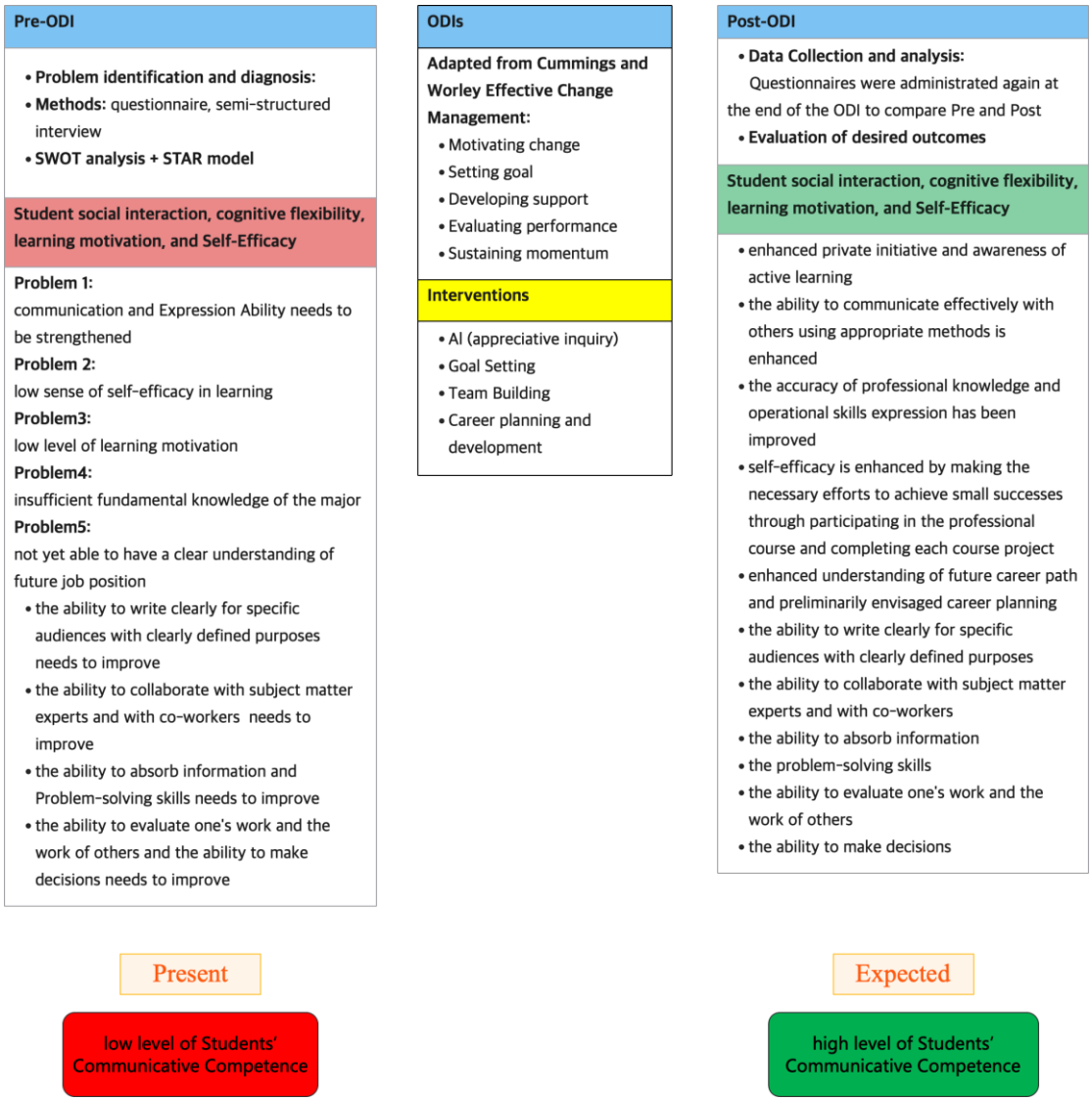
Conceptual Framework



The conceptual framework was established based on the theoretical framework listed in Figure 1. The independent variables were students' learning motivation, self-efficacy, cognitive flexibility, and social interaction. The dependent variable is communicative competence. The researcher assumed that students' communicative competence could be improved by developing their learning motivation, self-efficacy, cognitive flexibility, and social interaction.

Figure 2

Action Research Framework



Through data analysis and SWOT analysis, the researcher identified five major problems for Information Technology significant Students' cognitive flexibility, social interaction, learning motivation, self-efficacy, and communication and expression ability needs to be strengthened; a low sense of self-efficacy in learning; low level of learning motivation; insufficient fundamental knowledge of the major; not yet able to have a clear understanding of future job position. Based on these problems, the researcher designed five organization development interventions to enhance students' social interaction, cognitive flexibility, learning motivation, and self-efficacy in order to enhance students' communicative competence.

As listed in Figure 2, the interventions of appreciative inquiry (AI), goal setting, team building, and career planning and development aim to change students' perception of success as information technology talent or in meeting the challenges; The interventions of goal setting, career planning and development, and team building aim to change students' perception of the usefulness of the coursework and the knowledge gained in the course, enhance private initiative and awareness of active learning, and enhance understanding of future career path and

preliminarily envisaged career planning; The interventions of appreciative inquiry (AI), and team building aim to strengthen the ability to communicate effectively with others using appropriate methods; The interventions of appreciative inquiry (AI), and goal setting aim to enhance the accuracy of professional knowledge and operational skills expression ; The interventions of goal setting aim to change students' self-efficacy, which is enhanced by making the necessary efforts to achieve small successes through participating in the professional course and completing each course project. The expected outcomes would be that students' learning motivation and self-efficacy be improved and students' communicative competence be enhanced efficiently.

Research Methodology

Research Hypothesis

H1o: The difference in students' cognitive flexibility between pre- and post-ODI is insignificant.

H1a: The difference in students' cognitive flexibility between pre- and post-ODI is significant.

H2o: The difference in students' social interaction between pre- and post-ODI is insignificant.

H2a: The difference in students' social interaction between pre- and post-ODI is significant.

H3o: The difference in students' Self-Efficacy between pre- and post-ODI is insignificant.

H3a: The difference in students' Self-Efficacy between pre- and post-ODI is significant.

H4o: The difference in students' Learning Motivation between pre- and post-ODI is insignificant.

H4a: The difference in students' Learning Motivation between pre- and post-ODI is significant.

H5o: The difference in students' Communicative Competence between pre- and post-ODI is insignificant.

H5a: The difference in students' Communicative Competence between pre- and post-ODI is significant.

Participants

The data for this current study was collected from the School of Telecommunication Engineering (STE) at Beijing Polytechnic. The participants, 42 computer network technology major first-year students from the School of Telecommunications Engineering (STE), enrolled in the same courses. All participants were assigned to the Quasi-experiment group (QEG) and participated (N=42) in all OD intervention processes. This current research was conducted in the Computer Network Foundation (CNF) class from June to July of the spring semester 2023. The questionnaire and interview were administered at the beginning of the semester to measure the entry level of each group before the ODI. It was administered again at the end of the intervention to identify the change level.

Methods and Instruments

The current research adopted a mixed-method approach combining qualitative and quantitative research. The researcher applied questionnaires, semi-structured interviews, ODI reflection reports, and classroom observation in this research. The questionnaire, which includ

es five parts, was used to identify students learning motivation, self-efficacy, cognitive flexibility, social interaction, and communicative competence levels in the pre- and post-ODI phases. The semi-structured interviews, ODI reflection reports, and classroom observation were used to assess students' learning results and processes.

The researcher conducted a validity test of the questionnaire. The validity of the questionnaire was confirmed by five experts (two experts from the Ph.D. OD program and three other experts in IT and engineering education) opinions toward the questions and whether or not they were congruent with definitions of terms. The validity of all parts of the questionnaires was tested, and their IOC value was above 0.7. Thirty samples were collected among STE first-year students at Beijing Polytechnic, who had similar characteristics to the target participants in this research but not the same group of participation of ODIs. After getting the original data from 30 participants, the researcher conducted the reliability test with SPSSAU. Reliability analysis of five parts of the questionnaire showed that the internal consistency of Cronbach's alpha = .983 (AMS), = .983 (GSES), = .989 (CCS), = .958 (CFS), = .985 (DSSI) were good.

Procedure

Action Research Model was employed in conducting this research, which focused on studying the impact of ODI on cognitive flexibility, self-efficacy, learning motivation, and social interaction to improve communicative competence. The process included three stages: Pre-ODI, ODI, and Post-ODI.

Pre-ODI Stage (Preliminary Diagnosis)

The problem was identified at this stage based on the preliminary diagnosis Questionnaires, interviews, and SWOT and SOAR analysis. Two hundred eight survey questionnaires were used to measure the perception of respondents on the current situation of teaching and learning. Also, in the pre-ODI process, the researcher began with participant observations, semi-structured interviews, and an online questionnaire to gain insight into the target organization. After communication and coordination with the school leaders, the researcher can obtain authorization and support from the top-level managers. Subsequently, the researcher maintained dialogue and observation with respondents in the ODI process to ensure effective intervention implementation.

The results showed that the source of students in STE is generally complex. Participants' interest in learning, learning process, and learning effect varies greatly. Their learning ability could be stronger, and their learning motivation needs to be improved. They were not in the habit of studying hard and needed better interpersonal communication skills. The comprehensive ability and quality of participants need to be further improved. As a result, they have low self-efficacy, are reluctant to communicate with others, and cannot take the initiative to participate.

ODI Stage

This ODI stage was aimed to (1) propose and implement a variety of OD interventions to improve students' cognitive flexibility, self-efficacy, learning motivation, social interaction, and communicative competence in STE and (2) to determine the impact of ODIs on cognitive

flexibility, self-efficacy, learning motivation, social interaction, and communicative competence. Based on the problems identified during the pre-ODI stage, the researcher designed four organization development interventions to enhance students' social interaction, cognitive flexibility, learning motivation, and self-efficacy, then to enhance students' communicative competence. The research aims to change students' perception of success as information technology talent or in meeting the challenges; The interventions of goal setting, career planning and development, and team building are aimed to change students' perception of the usefulness of the coursework and the knowledge gained in the course, enhance private initiative and awareness of active learning, and enhance understanding of future career path and preliminarily envisaged career planning; The interventions of appreciative inquiry (AI), and team building are aimed to strengthen the ability to communicate effectively with others using appropriate methods; The interventions of appreciative inquiry (AI), and goal setting are aimed to enhance the accuracy of professional knowledge and operational skills expression ; The interventions of goal setting are aimed to change students' self-efficacy, which is enhanced by making the necessary efforts to achieve small successes through participating in the professional course and completing each course project. The expected outcomes would be that students' learning motivation and self-efficacy be improved and students' communicative competence be enhanced efficiently.

The ODI workshops were designed and implemented from June to July of 2023, focusing on improving IT communicative competence among first-year students of a Polytechnic in Beijing through enhancing students' cognitive flexibility, self-efficacy, learning motivation, and social interaction. The AI workshop reflection report can reflect the achievement and experience of students participating in this ODI activity and improve their Self-Efficacy, Social Interaction, and Communicative Competence levels. The goal-setting reflection report can demonstrate the achievement and experience of students participating in this ODI activity and improve their intention of Learning Motivation, Self-Efficacy, and Cognitive Flexibility. The team building reflection report can indicate the achievement and experience of students participating in this ODI activity and improve their intention of Learning Motivation, Cognitive flexibility, and Social Interaction. The career planning and development report can reflect the achievement and experience of students participating in this ODI activity and improve their employability and level of Learning Motivation.

Table 1

ODI Implementation Schedule

No	Date	Dur. (Hours)	Executor	Participants	Intervention
1	15th Jun 2023	2	Researcher	42(QEG)	Student background information survey
2	15th Jun 2023	5	Researcher	Faculties 42(QEG)	Discussion with key stakeholders
3	16th Jun 2023	2	Researcher	42(QEG)	CF, SI, LM, SE, and CC questionnaires
4	16th Jun 2023	3	3 Observers	42(QEG)	Class observation by three instructors #1
5	18th-27th	4.5	Researcher	42(QEG)	Appreciative Inquiry #1-3

No	Date	Dur. (Hours)	Executor	Participants	Intervention
	Jun 2023				
8	28th-29th Jun 2023	2	Researcher	42(QEG)	Overall self-reflection on the effect of AI
9	16th Jun 2023	2	Researcher	42(QEG)	Goal Setting
10	17th-18th Jun 2023	2	Researcher	42(QEG)	Overall self-reflection on the effect of Goal Setting
11	19th Jun 2023	3	3 Observers	42(QEG)	Class observation by three instructors #2
12	15th-23rd Jun 2023	8	Researcher	42(QEG)	Team Building #1-4
16	24th-26th Jun 2023	2	Researcher	42(QEG)	Overall self-reflection of the effect of Team Building
17	20th-21st Jun 2023	3	3 Observers	42(QEG)	Class observation by three instructors #3
18	15th-23rd Jun 2023	6	Researcher	42(QEG)	Career Planning and Development #1-3
21	24th-26th Jun 2023	2	Researcher	42(QEG)	Overall self-reflection of the effect of Career Planning and Development
22	27th-28th Jun 2023	3	3 Observers	42(QEG)	Class observation by three instructors #4
23	26th Jun 2023	2	Researcher	42(QEG)	Data collection: CF, SI, LM, SE, and CC questionnaires
24	27th-29th Jun 2023	12	Researcher	42(QEG)	Data analysis: Analysis of results of the ODI reflection report, and the classroom observation feedback
25	1st-6th Jul 2023	12	Researcher	Faculties 42(QEG)	Feedback to stakeholders, documenting effective practice, and Sustaining momentum

** Quasi-experiment group (QEG)*

According to Cumming and Worley's change management model, there are five critical elements of successful change management (Cummings & Worley, 2014). Considering the situation of the target organization, Four sets of OD interventions were developed based on the action research framework, as follows: (1) Motivating change-Appreciate Inquiry (AI), (2) Creating a vision-Goal Setting, Career Planning and Development, (3) Developing political support-Team Building. Table 1 briefly introduces each ODI used in this current research.

Post-ODI Stage

The same set of questionnaires was administered again to the Quasi-experiment group at the end of the semester to test whether there was any significant difference in students' cognitive flexibility, social interaction, learning motivation, self-efficacy, and communicative competence before and after ODIs. At the end of ODI, the Quasi-experiment group team participants were supposed to finish reflection reports. A semi-structured interview was used to collect data from the target populations at the post-ODI stage to measure the current situation of each group in students' learning motivation, self-efficacy, cognitive flexibility, social interaction, and communicative competence. Interview transcripts were recorded and collected; each telephone interview was recorded, converted to the transcript, and translated from Chinese into English for coding.

Statistical Procedure

The quantitative analysis includes standard deviation, mean, and independent sample t-test to analyze the quantitative data. The significance level is predetermined at $p \leq 0.05$, with the corresponding confidence level of 95%. The researcher collects qualitative data from the Quasi-experiment group using telephone and survey interviews, and ATLAS.ti analyzes these data. The data from the qualitative analysis were analyzed with content analysis. The researcher employs content analysis to learn more about the interview content's goals, messages, and outcomes. They can also conclude the authors and readers of the texts they are analyzing. The researcher selected words frequently mentioned after reading the original data and completed coding. Then, the researcher labeled relevant codes and sorted data into key headings. Then, the researcher created categories by bringing several codes together. In addition, participatory observations compare the observed data with the college's internal and open documents, and cross-examination was taken in the current research. The result from ATLAS software described the patterns for concluding responses to the research question.

Results

The results show that ODI can positively impact social interaction, cognitive flexibility, learning motivation, self-efficacy, and technical communication skills. Both qualitative and quantitative analysis can support the above findings. After ODI, the Quasi-experiment group's average scores in social interaction, cognitive flexibility, learning motivation, self-efficacy, and technical communication ability were improved. In summary, the Quasi-experiment group showed improvement between pre-ODI and post-ODI. The specific analysis is as follows:

Pre-ODI

Based on the results of qualitative analysis, the researcher found that good school software and hardware environments could have made students meet the expected state. Contrary to the expectation, an atmosphere of insufficient confidence, a lack of initiative and responsibility, long-term career plans, and negative learning motivation have permeated the classroom, as reluctance to communicate with others and low levels of cognitive flexibility. These phenomena directly hindered the student success and development of the future.

ODI

Four ODI processes were conducted in this study, and the participants in each ODI were the same 42 students from the Quasi-experiment group.

Team building. According to the results of the preliminary diagnosis, the students mainly needed better communication and expression skills, lack of self-confidence, no clear goal, no plan of action, and easy to give up when implemented. Through questionnaire surveys and face-to-face interviews, students are given feedback, explanations, and explanations of reading methods, and feedback reports are provided. Students' deficiencies have been improved to some extent, some of which have statistically significant effects.

Career planning and development. Judging from the initial diagnosis results, most students still need clear career goals and positioning. In response to this situation, the researcher carried out career planning and development interventions to help them clarify their short-term

and long-term goals and guide them to work hard, learn seriously, and accumulate well to achieve these goals.

Appreciate Inquiry. In the preliminary diagnosis and the observation, IT major students at Beijing Polytechnic are relatively more flexible than the thinking of other majors. Still, they need more logical thinking, professional communication, and expression skills and appear less innovative and adaptable after entering society. Ultimately, this was to help the Quasi-experiment group's respondents improve their positive learning motivation and gain useful work skills and knowledge.

Goal setting. After the phase of AI intervention, the participants reinforced positive expectations of success and the idea of making changes to the status quo; that is, they were prepared for the subsequent intervention. The next stage of the intervention process was mainly to help them establish fixed, challenging and expected achievable personal goals.

Post- ODI

Based on the qualitative analysis, students had an increasing sense of self-confidence and willingness to communicate expression after the ODIs. They were more likely to agree that the school had a goal for future success and a strategy to achieve it. Also, they believed participating in organizational development practices would improve their skills, and they further learned the importance of social skills, such as communication, for future careers. In conclusion, the findings suggest the recommendations for enhancing cognitive flexibility, learning motivation, and communicative competence in IT professional courses to sustain students' momentum. According to the qualitative analysis results with Semi-structured interviews and ODI reflection reports, it can be stated that ODI improved cognitive flexibility, social interaction, self-efficacy, learning motivation, and communicative competence. Classroom observations by three instructors were also employed to identify areas of strengths and weaknesses related to the participants' learning motivation, self-efficacy, cognitive flexibility, social interaction, and communicative competence. Qualitative data results of items of classroom observation showed that most of the variables were enhanced after ODI.

Table 2

Difference of variables between Pre and Post-ODI

No.	Item	Mean	SD	Mean Difference	*t*	*p*
1	CC-post	4.06	0.72	0.28	2.104	0.042*
	CC-pre	3.78	0.63			
2	LM-post	3.97	0.65	0.33	2.555	0.014*
	LM-pre	3.64	0.55			
3	SE-post	4.02	0.71	0.25	1.722	0.093
	SE-pre	3.77	0.64			
4	SI-post	4.13	0.67	0.28	1.967	0.056

No.	Item	Mean	SD	Mean Difference	*t*	*p*
	SI-pre	3.84	0.63			
5	CF-post	3.96	0.70	0.34	2.206	0.033*
	CF-pre	3.62	0.61			
* $p<0.05$ ** $p<0.01$						

Regarding quantitative analysis, inferential data was used to find the differences in dimensions between pre and post-ODI. An independent sample t-test tested the result of the hypotheses to identify the differences between the means of pre and post-ODI. The findings found that the Quasi-experiment group significantly improved between pre- and post-ODI in cognitive flexibility (CF), learning motivation (LM), and communicative competence (CC), as listed in Table 2. According to qualitative analysis, the researcher found the behavior of respondents of the Quasi-experiment group significantly enhanced between pre- and post-ODI in cognitive flexibility, social interaction, self-efficacy, learning motivation, and communicative competence.

Discussion

For the first research objective, the researcher and stakeholders identified negative factors affecting teaching and learning among IT major first-year students and areas for improvement. There are mainly the following five factors: In communicative competence, stu dents' need for expressive and written narrative ability is specifically reflected in need for more formatted technical document writing and language expression ability. In terms of self-efficacy, due to relatively low entrance scores, most students lack self-confidence and emotional control. Regarding learning motivation, students usually need clarification and have vague expectations for their future. The lack of a clearer career plan is the main reason for the lack of learning motivation. Most students need help to establish the connection between what they have learned and their future careers.

Regarding cognitive flexibility and social interaction, some students lack social interest, prefer to be alone, and cannot engage in purposeful and selective interpersonal interaction; most students have rigid thinking patterns and poor emotional regulation ability. Therefore, the researcher discussed with the school management and jointly decided to conduct organizational development interventions. This study aimed to design and implement organizational development interventions (ODIs) to improve students' communication skills by enhancing their self-efficacy, learning motivation, cognitive flexibility, and social interaction, further developing their employability.

For the second research objective, the ODIs were designed by the researcher with the help of managers from different levels of the focal organization. The ODI design was based on preliminary diagnosis, the needs of the school, and the available timeframe. The design includes Appreciative Inquiry, Team Building, Goal Setting, and Career Planning and Development interventions based on Cummings and Worley (2014).

First, the study employs Appreciative Inquiry interventions based on the literature review. The previous study found that Appreciative Inquiry tools work great as communication exercises in professional meetups and discussions. Also, it can bring some benefits as follows:

open communication, more engagement and work responsibility, the scope for developing new skills and improving existing skills, better decision-making power, attaining a positive learning environment, and fostering a conducive environment at work (Chowdhury, 2019).

Also, in this study, the researcher took goal-setting and team building interventions to change learning problems with IT major students from STE to improve their self-efficacy, social interaction, and communicative competence.

Second, this current research employs Goal-setting interventions based on the literature review. Several published reviews have reported that goal setting and goal attainment are important components of self-determination for students with various developmental (Fowler et al., 2007; Konrad et al., 2007). The literature has indicated that goal-setting skills can direct attention and effort toward relevant activities and positively affect task performance (Copeland & Hughes, 2002). Also, in this study, the researcher took goal-setting interventions to change such problems with IT major students from STE to improve their intention of LM, SE, and CF.

Third, this current research employs teaming building interventions based on the literature review. Team building has been shown to affect team effectiveness positively (Shuffler et al., 2011). Team building impacts cognitive, affective, process, and performance outcomes. They had the most powerful effect on affective and process works, which implies that team building can help benefit teams experiencing issues with negative affect, such as lack of cohesion or trust. It could also improve groups suffering from process issues, such as a lack of role clarification (Salas et al., 2008). The team building reflection report can reflect the achievement and experience of students participating in this ODI activity and improve their intention of LM, CF, and SI. Participation in team building activities and presentations can also strengthen participants' willingness and communication ability.

Last, this current research employs career planning and development interventions based on the literature review. Two recent research proved career planning and development interventions' efficacy in improving career maturity, career decidedness, vocational identity, and career decision-making self-efficacy (Langher et al., 2018). This is relevant once career-decided students get more involved in their studies (Yu et al., 2018). As a result, they will be eager to continue their personal development at their chosen higher education institution (Bargmann et al., 2022). Also, in this study, the career planning and development interventions can reflect the achievement and experience of students participating in this ODI activity and improve their employability and level of LM, SE.

For the third research objective, based on the qualitative analysis of interview data and multiple questions involving five variables, post-ODI responses were more positive than pre-ODI. For example, students and observers' reflective statements mentioned participants' increasing self-confidence and willingness to communicate expression after the ODI of action research. Respondents were more likely to agree that the school had a goal for future success and a strategy to achieve it, and they were more confident that they had found a path to their post-ODI goals. Before the ODI, the respondents were confused between reality and the future. After ODI, respondents believed participating in organizational development practices would improve their skills, further clarifying the importance of social skills, such as communication, for future careers. The quantitative analysis results also proved a significant difference in CF, LM, and CC between the pre- and post-ODI stages.

Based on the above discussion, the qualitative and quantitative analysis results showed that cognitive flexibility, learning motivation, and communication skills were improved after OD intervention. Thus, both qualitative and quantitative analyses demonstrated that ODI positively fostered participants' cognitive flexibility, learning motivation, and communication skills. Action research worked as a meaningful ODI tool in this current research and has confidence as a useful method in future research.

Implication

This current research provides some enlightenment to the learning and teaching of IT majors from a new perspective. As engineering students, by participating in ODI, they have improved their psychological knowledge and experience, making them feel fresh and stimulating their inner motivation. This current research further reveals that team, communication, and technical skills are equally important. At the same time, it provides a way for teachers to improve students' communication ability and effect by organizing development interventions, encouraging students to change their habits, dares to break through themselves and achieve self-improvement.

Organizational development interventions, career planning, and development interventions are carried out in the classroom environment of professional IT courses to help students establish career planning and realization paths. Goal-setting interventions help students develop long-term and short-term goals and encourage them to work toward them without wasting much time. Team building interventions help students enhance team spirit and a sense of teamwork and promote the development of their interpersonal skills. AI intervention can positively motivate them and stimulate their potential. The results show that IT is feasible for action research and organizational development intervention in IT majors in higher vocational colleges.

Recommendation

Based on the organizational diagnosis, this study identifies the initial state of the target populations in SI, CF, LM, SE, and CC, then improves them through ODI, and then finds the impact of SI, CF, LM, and SE on CC. This study provides a new perspective to improve college students' employability and employment rate.

As the main finding of this study, ODI improves students' flexibility, learning motivation, self-efficacy, social interaction, and communicative competence. Since this study only targets one Quasi-experiment group, better results can be obtained if a controlled study can be conducted to expand the scope and composition of the subjects.

The students in the study need a higher level of social interaction, cognitive flexibility, learning motivation, self-efficacy, and communicative competence in the future to adapt to the workplace and meet the requirements of the workplace. Individuals should take the initiative to strengthen their sense of responsibility, improve their subjective industry, maintain their competitiveness, and strive for progress, which will be the key influencing factors for their career success.

Limitations and Recommendations for Further Research

First, the study sample is relatively small, with only 42 students from the same school and no students from the second or third year (starting to enter the enterprise for internships), so the findings may be limited in generality and scope. Future research may address this question using a larger sample of students from several universities or institutions. Second, the organizational development invention period lasted two months, with little expectation for long-term effects. Third, most of the subjects in this current study were male students, so how the findings apply to female college students in information technology classrooms needs to be clarified. Also, the current research only looked at four factors, and other factors may also

be related to communication skills. Future studies can be more specific and focus on technological communicative competence, considering the development of technological communication models/theories.

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