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# Is online collaboration process suitable for digital youth organization? A design approach

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## Abstract

**Purpose** – Collaboration is significant but difficult for the development of youth organizations, this research aims to explore whether the online collaboration process is suitable for youth organizations' collaboration and improve their effectiveness and efficiency.

**Design/methodology/approach** – This research has applied a design approach using the collaboration engineering method, to design an online collaboration process for youth organizations to improve their effectiveness and efficiency. Using a self-developed group support systems (GSS) tool, the authors have tested the new collaboration process through an experiment among four youth organizations and conducted a survey afterwards.

**Findings** – The new process improves the collaboration effectiveness and efficiency. The research also identifies the detailed relationships among influencing factors in the online collaboration process.

**Originality/value** – There is little research in the context of computer mediated youth organization collaboration. This research designs an online collaboration process for the effective and efficient collaboration of youth organizations and has it tested among representative youth organizations, providing practical instructions for digital youth organization collaboration in the context of global pandemic.

**Keywords** Collaboration engineering, Efficiency, Effectiveness, Collaboration process, Youth organization

**Paper type** Research paper

## 1. Introduction

Due to the outbreak of Covid-19 and the recurrence of the pandemic situation, we have to face the circumstance of "social isolation" resulting from "physical isolation" policy (Yang, Xiao, & Chen, 2021). This prohibits organizations' offline activities, making it difficult to carry out in-person communication and collaboration, thus organizations have to make corresponding changes to adapt to the transition of environment (Kim, Byun, & Thomson, 2022). In this case, various remote work modes have been developed or promoted to conquer the problem of distance (De Lora & Termini, 2020) and achieve the goal of effective and efficient collaboration under today's specific social background.

A youth organization is a nonprofit group primarily operated by young people, which enables them to develop as individuals, better fit in the environment and contribute to society (Sarver, Johnson, & Verma, 2000; Glass, 2018). The organizers of a youth group must adjust to

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life at a college or university while balancing academic, social and personal concerns (Boyer, Thomas, Rorrer, & Cooper, 2010). Therefore, they are required to complete their work in the youth organization with efficiency. And the development of the organizations cannot be supported only by individuals but also needs collaboration (De Vreede & Briggs, 2018), in occasions of vacation time, youth collaboration work may be limited by location issues, thus a computer-mediated approach will be critical. However, goals are never easy to reach since youth organizations face myriad challenges which include a complex set of problems while trying to improve the efficiency and effectiveness of collaboration (Nunamaker, Briggs, Mittleman, Vogel, & Balthazard, 1996; Mehdipour & MohebiKia, 2019). Moreover, some features of youth organizations, such as diverse backgrounds (Boyer *et al.*, 2010; Inegbedion, 2020), can introduce severe problems including misunderstandings, prejudice and inequality (Filak & Pritchard, 2007). These problems hinder collaboration, and the pandemic situation of Covid-19 added more restrictions to it, making the collaboration even more difficult (Giauque, Renard, Cornu, & Emery, 2022). It should also be noted that the failure of collaborative efforts can be expensive in time and money, eroding strong working relationships (Bolton and Bolton, 1996), and even leading to dissolution. Therefore, studying techniques to improve the effectiveness and efficiency of collaboration is of paramount significance for the long-term development of digital youth organizations (Al-Shaiba, 2020).

Various configurations of organizational characteristics are differentially related to effectiveness and efficiency (Ostroff & Schmitt, 1993; Sowa *et al.*, 2004), both internal and external relations are significant (Fan, Wong, & Zhang, 2007; Shin & Ahn, 2021; Martín Pérez & Martín Cruz, 2020; Edwards & Cable, 2009; Kellermanns, Walter, Floyd, Lechner, & Shaw, 2011; Alrowwad, Almajali, Masa'deh, Obeidat, & Aqqad, 2019; Wach, Wehner, Weißenberger, & Kabst, 2020; Kacperska & Łukasiewicz, 2020) to the improvement of overall effectiveness and efficiency of the organization. In the case of a youth organization, four cohesion, organization, resourcefulness and energy (CORE) conditions were assumed to be centrally important for youth organizations to function effectively (Conyne, 1983). The literature has also shown that democracy (Ostroff & Schmitt, 1993; Mehdipour & MohebiKia, 2019) and shared understanding (Conyne, 1983; Darch, Carusi, & Jirotka, 2009; Gomes & Tzortzopoulos, 2018) play important roles in efficiency.

Generally, however, expertise facilitators are not feasible for youth organizations since they require a large set of tasks and responsibilities to help organizations optimize their productivity, which requires them to have complicated skills and receive extensive training (Clawson and Bostrom, 1993; De Vreede & Briggs, 2018); hiring such facilitators can be expensive. Thus, it is better to use collaboration engineering (CE), which is defined as "an approach to create sustained collaboration support by designing collaborative work practices for high-value recurring tasks, and transferring those to practitioners to execute for themselves without ongoing support from professionals" (Briggs, de Vreede, & Nunamaker, 2003; De Vreede & Briggs, 2019). This approach allows the youth organizations to apply one specific well-designed collaboration process autonomously without the requirement to develop additional expertise. And CE application can also help convergence in crowdsourcing (Cheng *et al.*, 2020).

Surveys have also indicated that there have been a large number of youths using the Internet to communicate since the end of the last century (Park & Kwon, 2018). The Internet has altered the way we access information (Sironi & Kashyap, 2021), and made it possible to provide remote access and computer-mediated communication to support interpersonal exchange and debate in organizations (Barros & Verdejo, 2000). In this area, some researchers have studied collaboration process design and validation, however, they focused on different areas such as requirements negotiation (Briggs & Grünbacher, 2001), gathering end-user feedback (Bragge, 2005), risk identification and assessment (De Vreede & Briggs, 2005; De Vreede, Briggs, & Massey, 2009), requirements elicitation (Azadegan, Cheng, Niederman, & Yin, 2013), shared

understanding (Bittner & Leimeister, 2013) and trust issues (Cheng, Fu, Han, & Zarifis, 2017); these effectiveness and efficiency studies are limited to higher level primary impact factors with models and theories, yet have not investigated the impact sub-factors in practical experiments and their relationships. Recently, some researchers have paid attention to practical experiments in specific area, Fu, Cheng, Su, Bilgihan, and Okumus (2020), for example, focused on the design of hotel management collaboration process. Nevertheless, minimal attention has been paid to the online collaboration processes in youth organizations that can contribute to the improvement of their effectiveness and efficiency. In addition, there is little research in the context of computer mediated youth organization collaboration.

Therefore, in order to fill this research gap, we first draw upon the literature on youth organizations, effectiveness and efficiency, and CE to determine important factors and details in collaboration processes from the perspective of youth organizations. Moreover, we aim to provide a reusable, flexible and structured collaboration process to support group collaboration more effectively and efficiently based on our review of the literature. Then we test the new process in a website environment with participants from various youth organizations. The website is a prototype of a simple group system developed by the authors. Through experiments and analysis of the results, we aim to determine the answers to these questions: (1) Whether the designed process can improve effectiveness and efficiency in the youth organization, (2) Factors that can impact collaboration effectiveness and efficiency of youth organizations and (3) Whether group support systems (GSS) is useful to support youth organizations.

In the following sections, we will first review the literature to present a more detailed description of the theoretical background, followed by the research method and design model. We then talk about the experiments and analyze the results from a qualitative approach. We conclude, by addressing the implications and limitations of our study, and present ideas for further research.

## 2. Literature review

### *2.1 Youth organization*

Youth organization plays an important role in the comprehensive growth of students. Heath and McLaughlin (1994) gave attention to explaining the importance of youth organizations for development by investigating learning and working opportunities provided by the youth organization. Some researchers found that youth organization will improve the students' college experience, and provide an overall improvement in their educational experience (e.g. Abrahamowicz, 1988; Filak & Pritchard, 2007). It is also found that major-oriented student organizations will help students perceive bonds to their major and lead to better performance (Nolen, Daniel, & Bucklin, 2021). However, the operation of youth organizations is sometimes challenging, for the organizations might face some problems such as misunderstandings, struggle, prejudice and inequality (Tannock, 1999; Filak & Pritchard, 2007; Sahoo, 2020), which may hinder organizational collaboration (Giauque *et al.*, 2022).

The majority of the research we looked at focused on what can be gained in youth organizations and the participants' influence on one another, including, studying the leadership skills of the members (Dormody & Seevers, 1994), sense of belonging to the university (Glass, 2018), and relationships among youth leadership, life skills development and participation in youth organizations (Wingenbach & Kahler, 1997).

Although there are a wide variety of studies of youth organizations, very few of them can tell us exactly what the young organizers should do to collaborate effectively and fix the problems they are facing. However, research has shown that the failure of collaborative efforts can be expensive, eroding strongly on working relationships (Bolton and Bolton, 1996).

*2.2 Effectiveness and efficiency*

A review of 20 years of empirical studies concerning nonprofit organization effectiveness found that organizational effectiveness, illustrating how effective the organization reaches its goals based on resource allocating and adaptation to the external conditions (Islam, Said, Sumardi, & Rahman, 2020; Douglas, Merritt, Roberts, & Watkins, 2021), was both a powerful and problematic concept (Forbes, 1998). It involved various aspects such as communication effectiveness, decision-making effectiveness (Hagerer, 2019), competing advantages (Jha, 2019) and fulfilling of stakeholders' demands (Thompson, 2021). A youth organization is different from a profit organization since its effectiveness is intangible in contributing to the difficulty of quantitative effectiveness assessments (Wingenbach & Kahler, 1997). Some researchers measured organizational effectiveness through a perceptual way (Mitchell, 2013; Wright, 2018) others considered it may cause bias (Mitchell, 2013; Nobbie & Brudney, 2003). While for youth organizations, a specific three rings model named, the CORE model, was developed. In the CORE model, ring 1 is the most significant one (Conyne, 1983), it contains four conditions: cohesion (such as involvement, participation, a common shared mission and values), organization (such as clear goals, strategies and effective structure), resourcefulness (such as appropriate working knowledge and skills) and energy (such as motivation, persistence and initiation). These four CORE conditions were assumed to be centrally important for youth organizations to function effectively.

Effectiveness is commonly used to refer to an absolute level of either input acquisition or outcome attainment, while efficiency refers to an input-output ratio or comparison (Goodman & Pennings, 1977) that significantly affects organizations' sustainable development and viability (Al-Shaiba, 2020).

There are also a number of studies on organizational efficiency. The assessment of organization management efficiency requires comprehensive consideration of finance, social values (Abd Rahman & Zakaria, 2018) and technique (Kacperska & Łukasiewicz, 2020). Specifically, varied configurations of organizational characteristics are differentially related to efficiency (Ostroff & Schmitt, 1993). Political involvement (Fan *et al.*, 2007; Shin & Ahn, 2021), online transparency (Martín Pérez & Martín Cruz, 2020), trust between members (Edwards & Cable, 2009; Kellermanns *et al.*, 2011; Wach *et al.*, 2020), commitment (Alrowwad *et al.*, 2019) and knowledge sharing effects (Kacperska & Łukasiewicz, 2020) can all be significant influencing factors. In the case of a youth organization, democracy and shared understanding play an important role since too much decision-making power at high levels can lead to inefficient information processing (Ostroff & Schmitt, 1993; Mehdipour & MohebiKia, 2019). A shared understanding of the task is an important determinant for the performance of collaborative groups (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). For it can help eliminate misunderstanding (Gomes & Tzortzopoulos, 2018), which may lead to substantial losses of efficiency in the collaboration processes and the final outcome is sub-optimal (Darch *et al.*, 2009). Failure of diversity management such as cultural diversity management (Inegbedion, 2020), which means stages of lacking shared understanding, poses threats to organization efficiency. It was summarized that the positive effects of shared understanding in groups were: group member satisfaction, coordination, reduction of iterative loops and rework, innovation, team morale (Bittner & Leimeister, 2013) and decision quality (Wach *et al.*, 2020). Therefore, we can conclude that a shared understanding is important to improve the organizational effectiveness and efficiency.

*2.3 Facilitated collaboration*

To improve the organizational effectiveness and efficiency, collaboration among members is crucial (De Vreede *et al.*, 2009; Fu *et al.*, 2020). Through many years of field research, the facilitation method to collaboration has been widely accepted since it is useful to improve

organizational effectiveness and efficiency. Traditional facilitation is more helpful with the assistance of a professional facilitator (Ackermann, 1996), which is a person who gives instructions to guide the group members in their activities and help them focus on task outcomes (Bostrom, Anson, & Clawson, 1993; Kolfschoten, Niederman, Briggs, & de Vreede, 2012).

However, training a facilitator is very expensive for they need to be highly experienced in supporting working collaboration (Clawson, Bostrom, & Anson, 1993). A number of researchers have instead decided to focus on designing a repeatable collaboration process (e.g. Kolfschoten *et al.*, 2012), which incorporated the major facilitation expertise required and helped to address the challenge of employing an expensive professional facilitator (Briggs *et al.*, 2003; De Vreede & Briggs, 2019; Cheng, Fu, De Vreede, & Li, 2021), leading to the development of CE.

CE could be considered as a combination of facilitation and design, which aims to create collaboration processes that can be supported with collaboration support tools such as GSS (Kolfschoten, Briggs, de Vreede, Jacobs, & Appelman, 2006). Studies have shown that the use of GSS can substantially improve a group's effectiveness and efficiency (Ackermann, 1996; Fjermestad & Hiltz, 1999). The collaboration support tools like GSS are based on related modeling techniques, of which the facilitation process model (FPM) is a frequently-used one; it depicts details of each activity and the logic between different activities (De Vreede & Briggs, 2018). Recently, new forms of collaboration have been adapted in collaboration processes, bringing the area much progress (De Vreede & Briggs, 2019). For example, AI machine teammates has been proved beneficial to collaboration processes (Seeber, Bittner, Briggs, Vreede, & Sllner, 2019); Winkler *et al.* (2022) presented an optimized FPM that is available to adapt issues such as Artificial Intelligence (AI) and crowdsourcing; and the FPM has been further improved to provide mass collaboration settings like open innovation projects by assisting collaboration engineers to capture early design decisions (Winkler *et al.*, 2022).

In CE, there is a widely used design pattern, thinkLets (Briggs, de Vreede, Nunamaker, & Tobey, 2001; De Vreede, Kolfschoten, & Briggs, 2006). Thinklets is a named, packaged facilitation technique that can be incorporated into process designs by the collaboration engineers. This creates a predictable, repeatable pattern of collaboration among people working towards a goal. ThinkLets can be used as building blocks for team process designs in many domains where collaboration is required (Kolfschoten, Appelman, Briggs, & de Vreede, 2004; de Vreede *et al.*, 2005; Briggs & de Vreede, 2009). Through combining different thinkLets together, we can design various types of collaboration processes with support of GSS (Briggs *et al.*, 2003; De Vreede *et al.*, 2009; Kolfschoten, de Vreede, & Pietron, 2011) to give users collaboration guidance (Cheng *et al.*, 2021). There is a well-designed collaboration process model including task diagnosis, activity decomposition, task-thinkLets choice, agenda building and design validation described in (Kolfschoten, de Vreede, Charkrapani, & Konari, 2007).

The method of thinkLets has been put into practical use and brought about significant benefits. The area of public health is a vivid example, the incorporation of thinkLets into violence intervention system has been proved effective by gathering end users' information comprehensively and efficiently (Murray, Allen, Davis, & Taylor, 2020). Besides, to select an optimal choice of thinkLets, designers can use the six steps model: generate, reduce, clarity, organize, evaluate and consensus building (Briggs, Kolfschoten, de Vreede, & Dean, 2006).

In conclusion, it is necessary to improve the effectiveness and efficiency of youth organizations, and considering the features of them, the use of repeatable collaboration process may be appropriate. Although researchers have focused on the application of online collaboration processes in different fields and had it validated in fields such as hospitality and public health (Briggs *et al.*, 2013; Fu *et al.*, 2020; Cheng *et al.*, 2021), whether such model is adaptable in the field of youth organizations is yet to be explored. Therefore, based on the four CORE conditions model, we proposed a repeatable and flexible collaboration process for youth organizations specifically and had it verified using developed GSS tool, Discussion.

## 3. Model design

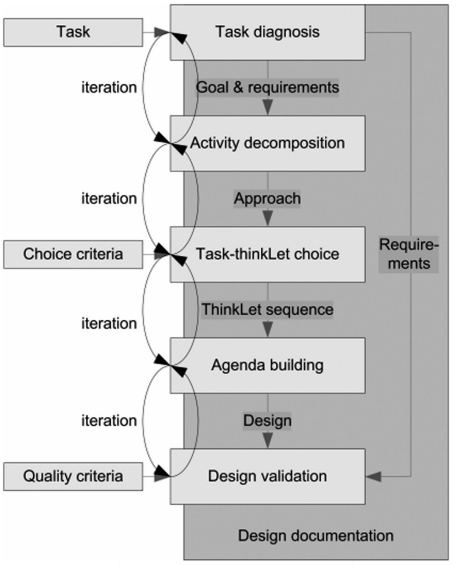
In this study, we adopt the design science research approach (Hevner, March, Park, & Ram, 2004) to the collaboration process design. The entire design process follows the CE approach developed by Kolfschoten *et al.* (2009) as shown in Figure 1.

The approach consists of five steps. In the first step, ask diagnosis, the characteristics of the youth organization are analyzed and the task goals are defined. We have completed the task diagnosis (Task 1) in a previous review, and concluded that due to the importance of youth organizations for development, a proper collaboration process is important. Therefore, in order to realize the worth of a youth organization facing myriad challenges, leaders are required to improve the effectiveness and efficiency of collaboration.

Activity decomposition (Task 2) is designed to decompose a task into separate activities that can use the process design patterns, i.e. thinkLets. To further decompose a task, we have summarized that, for a youth organization, four CORE conditions are important in effectiveness and democracy, and a shared understanding is an important factor for efficiency. The CORE conditions model of ring 1 means, cohesion (involvement, participation and a common shared mission and values), organization (clear goals, strategies and effective structure), resourcefulness (appropriate working knowledge and skills), and energy (motivation, persistence and initiation), such elements have been fully considered in our process design. We will use a model consisting of six parts: generate (Activity 1), reduce (Activity 2), clarify (Activity 3), organize (Activity 4), evaluate (Activity 5) and build consensus (Activity 6), to determine a more specific decomposition.

Task-thinkLet choice (Task 3) is used to select matched thinkLets for individual activities. These are mainly based on the definitions of Briggs *et al.* (2001) and other relevant researches (Cheng *et al.*, 2017, 2021; Fu *et al.*, 2020).

To generate ideas in Activity 1, we first choose the *FreeBrainstorm* thinkLet to motivate the generation of as many ideas as possible in a limited time, and choose the *Onepage* thinkLet if we do not require too many ideas. These thinkLets can help improve young people's involvement, participation, motivation and democracy.




**Source(s):** (Kolfschoten *et al.*, 2009)

**Figure 1.**
An approach to design collaboration processes

In Activity 2, we use *BroomWagon* to reduce the items to the key ones by voting as to which also show democracy and participation criteria, making sure all ideas can be sorted appropriately afterwards (Cheng *et al.*, 2017).

Clarify means to "Move from having less to having more shared understanding of concepts and of the words and phrases used to express them" (Briggs *et al.*, 2006; Briggs & de Vreede, 2009), therefore we see that the *FastFocus* thinkLet which "extracted a reduced set of ideas" (Cheng *et al.*, 2021) in Activity 3 is most suited for clarification and is conductive to building shared understanding among young members.

To organize ideas in Activity 4, we use *Concentration* which "focuses the group interaction on list items that require attention, and stimulates additional discussion about these items" (Briggs & de Vreede, 2009). Therefore, it also increases shared understanding.

To evaluate in Activity 5, we choose *StrawPoll t*o assess a number of concepts with respect to one or more criteria that shows the effective structure and results, paving the way for the final decision (Cheng *et al.*, 2021).

Building consensus (Activity 6) is achieved through solving conflict or disagreement among heterogeneous members, so we choose *Crowbar* to discover and discuss the reasons behind disagreement on certain issues since "dealing with differences in interpretation between team members by arguments and clarifications" (Bossche *et al.*, 2005; Fu *et al.*, 2020) is important to build consensus. The participants in a problem-solving situation have to make their ideas explicit to other collaborators, while disagreements require prompt justifications and negotiations, helping participants converge on a common object of shared understanding (Barros & Verdejo, 2000; Cheng *et al.*, 2021).

Based on the information from the previous steps, agenda building (Task 4) for the collaboration process is used to arrange collaboration procedures by the young people (Fu *et al.*, 2020), assisting them to better control each specific step. We use the primary section of the agenda design format (ADF) (De Vreede *et al.*, 2009; Hinrichs & Johnston, 2020), to specify all relevant information, including the name of each activity, the specific assignments, the deliverables that have to be created in the activity and the thinkLets. We then show the new collaboration process designed using the CE approach (Kolfschoten *et al.*, 2007; De Vreede & Briggs, 2018) in Figure 2, and the thinkLet part illustrated by the FPM (De Vreede & Briggs, 2005; Winkler *et al.*, 2022). The process is flexible and reusable. Therefore, a youth organization can skip or repeat individual steps as desired to fit their goals in practice. In the following paragraph we will further explain the process.

The meeting is opened by the facilitator (leader). Although thanks to the assistance of the collaboration process, ongoing support of well-trained professional facilitators will be unnecessary, the facilitator of the youth organizations still need to do enough preparation work and make a clear statement to the participants. The statements include goals, the time-table and limitations, etc. If there is insufficient preparation, the facilitator cannot go ahead and will have to repeat the preparation step again. After the preparation step, the facilitator will decide whether the meeting is to create a new activity, or start a discussion on how to organize a specific activity. In other words, they need to answer questions about "what to do" or "how to do it".

If they decide to make the "what to do" decisions, the participants will first brainstorm in a limited time and generate as many ideas about the goals as possible. The individuals should then explain each idea and the facilitator will remove some repeated ideas. The participants can discuss with the individual to ensure each idea has been clarified. Then the facilitator will begin the voting steps, where participants will score each idea from 1 to 5. These ideas will be shown from high to low. The facilitator then removes some of the ideas with the lowest scores. If reduction is not enough, the remaining ideas are explained further and voting begins again until the most outstanding idea is determined. In practice, the final result may be a

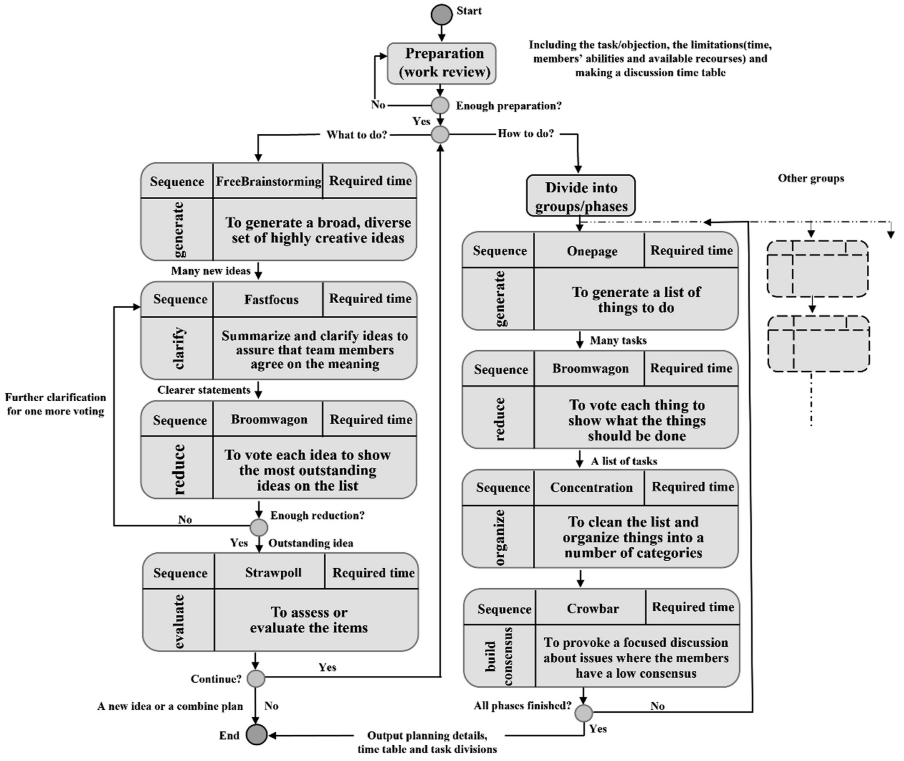



**Figure 2.**
The new collaboration process

combination of several ideas. The facilitator then decides whether to continue to the next step or not.

In the "how to do it" stage, the participants are divided into different groups such as marketing group, communication group and design group. Alternatively, the meeting can be divided into several phases such as preactivity, inactivity and after-activity. In a single group/phase, the participants are first required to propagate a list of things to do before the facilitator begins the voting. After the voting, the highest scoring tasks are organized, and a series plan is created. In addition, the facilitator needs to focus on the highly disputed problems, to allow the participants to express their own opinions to build the consensus. If the facilitator hasn't finished all phases, they move to the next phase and repeat the process.

In the final section, design validation (Task 5), the process design is validated to assess whether it can achieve the desired goal. We will show more details of design validation in the following section.

## 4. Experiments

### *4.1 Experiment design*

The design of a collaboration process requires validation before it is implemented in practice (Kolfschoten & de Vreede, 2009), this means the process should be tested in a real occasion (Fu *et al.*, 2020). In order to validate our collaboration process design, which is intended to improve the effectiveness and efficiency of collaboration, we invited four different Chinese youth organizations (Student Union, Youth Sports Association, Youth Tennis Association and

Youth Volunteers Association) to simulate a real case in their daily work. To do the experiments, they were required to apply our process in their online meetings. These participants ranged in age from 19 to 25 years, and were from different cities in China. The ratio of males to females was 4:5.

To support the online meeting, we used the Web based GSS tool, discussion. This tool has been developed by us, since the current range of GSS tools, such as Thinktank, MeetingSphere or Powermeeting are either too expensive for youth organizations to purchase or the connection speed are too slow due to the environment and location. The new GSS environment owns various capabilities and aims to improve online interactive collaboration performance which is fundamentally based on how effectively the explicit knowledge can be shared among people and how efficiently the created knowledge can be organized (Yang & Chen, 2008; De Vreede & Briggs, 2019). Discussion is a website that can realize the simple functions required in the new process such as creating new ideas, voting, timekeeping and chatting. Under the necessary guidance of the facilitator, team members could finish these tasks more autonomously and the whole process relies less on human interference comparing to traditional facilitating process. Therefore, this type of website is easy to build for a young adult who is familiar with website design and databases. We show an example snapshot of the website in the Appendix.

### *4.2 Choice of representative youth organizations*

There are five different types of meeting categories and 19 objectives according to literature (Standaert, Muylle, & Basu, 2013), organizations may attempt to achieve their objectives through corresponding choices of meeting categories (Shamekhi & Bickmore, 2019). Due to the characteristics of a youth organization, four types of meeting categories as well as corresponding objectives were chosen. The only one we exclude is "to discuss sensitive/confidential issues", which is obviously not a primary category in a youth organization meeting. The result is shown in Table 1, which represents the actual scenarios possible in a youth organization to some extent.

A common objective for a business meeting is to exchange information. A number of organizations have a routine meeting to exchange information, especially larger and more established groups, such as the routing meetings of a student union. Some youth organizations that are required to plan and organize many activities for their members will often have interactive discussions. The high quality of the discussion results is significantly important for them, such as the Youth Sports Association. However, some organizations pay less attention to the successful conclusion of their activities, yet the

| Categories | Meeting objectives |
|---|---|
| 1. To exchange information | (1) A routine exchange of information, (2) a nonroutine exchange of information, (3) clarify a concept, issue or idea, (4) giving or receiving feedback, (5) giving or receiving orders |
| 2. To have an interactive discussion | (1) Exchange/share different opinions or views of a topic or issue, (2) generate ideas on products, projects or initiatives, (3) negotiate or bargain on a deal or contract, (4) resolve conflicts and disagreements within a group |
| 3. To build relationships and trust | (1) Build trust and relationships with one or more individuals, (2) maintain relationships with one or more people and stay in touch, (3) assert and/or reinforce your authority, status, position to your team or others, (4) assemble a team and/or motivate teamwork on a project |
| 4. To make decisions | (1) Make a decision, (2) find a solution to a problem that has arisen, (3) generate interest or consensus on an idea |

**Table 1.**
Meeting objective categories

relationships and trust developed are paramount since the participants of the meeting will often meet to share the same hobbies, like the Youth Tennis Association. Some organizations, for example, the Youth Volunteers Association, also have meetings to exchange information; however, most of their goals are to make specific decisions that are to complete a task with respect to a specific issue or problem.

### *4.3 Data collection*

The participants of the chosen organizations were invited to complete the experiments and surveys. All participation was voluntary. The research team did not participate in the meeting. Instead, we observe their group interactions on the web and interview each participant after the meeting.

We attempt to get answers for the following questions by in-depth interviews:

*Q1.* What do you think about the online meeting?

*Q2.* Do you think the collaboration process is easy to learn?

*Q3.* Do you think the process can improve meeting effectiveness? How?

*Q4.* Do you think the process can improve meeting efficiency? How?

*Q5.* Have you found any problems or suggestions about the process or the online meeting?

We have designed the interview questions considering previous literature (Azadegan *et al.*, 2013). We asked as many questions as possible to help interviewees express their perceptions about Q1 to Q5. The number of respondents who completed the entire post-survey was 18. The scenarios for meetings of four youth organizations are shown in Table 2. We can use this table to determine the youth organizations' meeting type, member size, main activities in daily work, their primary meeting goal and their main problems.

It can be seen that the ministerial conferences in the student union have problems in efficiency related to low concentration and unreasonable arrangements. Moreover, there are also problems in coordination of the meeting time and place. Meetings in the Sport Association also suffer from the problem of efficiency, which is due to an unclear topic, low concentration, lateness and an effectiveness problem. The Youth Tennis Association has problems in effectiveness if the creative ideas are lacking, or members cannot express their ideas directly. The meetings of the Youth Volunteers Association do not call for much creation, yet democracy and comprehensiveness may be needed. A low participation rate is their main problem. In the experiment, the goal of the four organizations differs from each other. The Student Union need to summarize each departments work over the last week and make a new schedule for the following week; the Youth Sports Association is to generate a new idea about the cheerleading gymnastics competition and make an arrangement in each divided group; the Youth Tennis Association is supposed to discuss a new activity for the next weeks' training and to make an arrangement for it; while the goal of the Youth Volunteers Association is to make a decision about the weekend activity and to organize volunteers to go to an old people's home.

We also gave each person an interviewee ID, where "*−1" represents the leader in each organization.

## 5. Data analysis

We collect our data through a series of interviews. The transcripts were translated into English for further analysis since the original experiments and interviews were conducted in

**Table 2.**
The scenario for the meetings of four youth organizations

| Meetings in | Student union | Youth sports association | Youth tennis association | Youth volunteers association |
|---|---|---|---|---|
| Most common type | To exchange information | To have an interactive discussion | To build relationships and trust | To make decisions |
| Members | Over 80 members and eight departments | Five leaders and 35 members | A total of 31 members and five departments | About 60 members divided into 6 groups |
| Main activities | Each department has its own activities. In the experiments we focus solely on the ministerial conference | Organize basic events, sports competitions including a Cheerleading Gymnastics Competition, Basketball Game and Football Game | Holding Open Tennis Tournament, day-to-day training and internal communication, such as birthday parties and trips | A series of volunteer activities, such as science and technology entering communities, caring tutor and some volunteer teaching |
| Meeting goal | Routine meeting is to exchange information obtain feedback and make new schedules | The meeting is usually to discuss issues about activities, generate new ideas and build consensus | Most meetings are used to communicate and maintain relationships. They do not have important things to discuss usually, instead simply caring for everyone's feelings and whether they enjoy the sport | The main meeting goal is to make decisions, such as arrangements of activities. They need to consider everyone's thoughts and the end result must be a specific time and place, while being made clear enough for each person |
| Main problems (interviewee's comments) | 1) We often have meetings which will take up a lot of time, so efficiency is very important. However, free chatting often makes the meeting longer | 1) Sometimes we spend two or three hours discussing an issue, yet ultimately, we may still not achieve better results. The discussion topic is very unclear, and there are often new temporary problems that arise | 1) The Youth Tennis Association may require more creativity, but the concerns for improved efficiency are not significant. However, balancing the effectiveness and efficiency is very important | 1) Team decisions are too subjective: the leader presides over the meeting, throws ideas and decides the outcome. This makes decision-making effectiveness insufficient since it does not draw extensively on everyone's ideas |
| | 2) We often need to coordinate the time and place of the meeting which is very troublesome | 2) The meeting is relatively easy to get off track and we also have problems with lateness which are very inefficient | 2) Members often have doubts, making them unable to express their idea clearly or be afraid to express themselves, which can often bury some outstanding ideas | 2) It is difficult to drive the enthusiasm of the group members. If there are no stimulus factors, supervision or mandatory requirements, a member cannot propose a new idea |
| | 3) The main reason for low efficiency is due to the topic being very easy to drift away from, and the meeting arrangements becoming unreasonable, leading to discussions lasting longer | 3) The leader often finds it's difficult to make decisions since each idea has its own pros and cons. Sometimes divergence means the argument is unable to reach a conclusion | 3) Sometimes a new idea is not proposed, which is a big problem | 3) It is difficult to unify a time and place |

(*continued*)

| Meetings in | Student union | Youth sports association | Youth tennis association | Youth volunteers association |
|---|---|---|---|---|
| Experiment meeting theme | To summarize each department's work over the last week and make a new schedule for the following week | Generate a new idea about the Cheerleading Gymnastics Competition and make an arrangement in each divided group | Discuss a new activity for the next weeks training and to make an arrangement | Make a decision about the weekend activity, to organize volunteers to attend an old-peoples home |
| Main process | Preparation-Generate-Clarify-Evaluate | Preparation(review)-Generate-Clarify-Reduce-Further Clarify-Reduce-Evaluate-Group divided- Generate-Reduce-Organize- Build consenstus- | Preparation-Generate-Clarify-Reduce-Further-Clarify-Reduce-Evaluate-Phasesdivided- Generate-Reduce-Organize-Build consensus | Preparation(review)-Phases divided-Generate-Reduce-Organize-Reduce-Organize-Build consensus-next phase |
| Interviewees ID | A1; A2; A3; A4; A5 | B1; B2; B3; B4 | C1; C2; C3; C4 | D1; D2; D3; D4; D5 |

**Table 2.**

Chinese. To answer Q1, Q2 and Q5, we show the results and some examples of typical comments in Table 3.

In response to Q3 and Q4, we found that the process does help to improve the effectiveness and efficiency, and there are plenty of influencing factors that have relationships with them. Therefore, we put the results of the two questions together and performed further analysis in order to dig out the influencing factors of collaboration effectiveness and efficiency. We initially attempted to find the common statements from different participants and group comments of a similar nature or common themes by keywords. These keywords were then divided into different groups by themes, resulting in Table 4. In addition, we also present the statements in graphical form which shows the interconnections among precursor and effect variables. We aggregated and reformatted the statements in graphical form, such that a single graphical representation is presented.

Based on our further research, we can find various relationships between collaboration elements which come from the interview statements. Figure 3 shows the relationship hierarchy classification of our influencing factors, to make it clearer; there are some important relationships we want to emphasize:

Firstly, some elements (brainstorming, voting, evaluation, independent thinking, talk freely, clarification, written words, formal (Systematic) process, group division, summarizing previous experience and good preparation) should be given careful consideration since they mutually influence the final result. Different combination of the impacting factors can lead to different routes, voting, for example, is the only precursor input element leading to the quantitative method. And the quantitative method can lead to better decisions, building a consensus and high participation, which all result in improved effectiveness directly. According to the statements of interviewees, these should be given careful consideration.

Secondly, all elements will affect the satisfaction of a youth organization. The respondents view a number of precursors leading to particular types of outcomes that will finally result in effectiveness and efficiency, and then the satisfaction of a youth organization is improved. Members' satisfaction, a widely concerned concept, is the most important factor since it is the primary purpose of a youth organization (Sarver *et al.*, 2000; Boyraz, 2019).

In addition, there are six primary important elements that affect the effectiveness. Our qualitative analysis has found six elemental observations (high quality, better decision, objective and democracy, build consensus, high participation and improve leadership), which lead directly to effectiveness.

Furthermore, some factors impact efficiency interactively. Notably, Shared understanding, concentration, controlling, group division and summarizing previous experience are seen as the direct influencing factors. In addition, the systematic process can lead to high participation and improve the leadership; the latter can help with good preparation and controlling elements, which is paramount for efficiency. We also found that the better the preparation was, the stronger the control, the more the efficiency improved.

## 6. Discussion

In this section we draw conclusions on the new collaboration process from the analysis of the interview data.

(1) The collaboration efficiency of youth organizations is improved.

The new process improves the collaboration efficiency and minimizes the time needed, which gives the organizers more time to focus on other important issues. With the assistance of the new-designed facilitation process, the participants were only required to follow the leader's facilitation and focus on sub-issues. In comparison to meetings that have been made before, the new facilitation process enhances team members' autonomy in collaboration, and can

| Question | Results | Typical comments |
|---|---|---|
| Q1 | Nearly all of the respondents demonstrated an interest in the online meeting. It was not only important to update members, but also useful to solve many problems, including finding an available meeting room or suitable meeting time | "For example, when the weather is cold, we can make discussions online" (A1)<br>"It's so cool! No matter where you are, as long as you have the time and are able to connect to the Internet, we are able to discuss issues directly. It also provides a larger space" (A3)<br>"It is often difficult to agree upon the same time for the meeting. For instance, the regular meetings do not require everyone to get together, and people will sometimes have temporary things that conflict. We currently only require remote meetings which can also improve efficiency. Everyone will probably like this" (B1)<br>"Some people will easily get distracted in a face-to-face meeting, and they cannot express their own ideas" (B3)<br>"The online meeting can be used in the winter and summer vacation to understand everyone's opinions for next semester's activities, which is very effective" (C1)<br>"If time does not allow face-to-face communication, it is a good idea" (D4) |
| Q2 | All of the respondents reflected that the process is easy and clear to use. We list some examples of comments | "The process is very explicit, and there is a clear structure" (A5)<br>"Not very long, easy to grasp" (B1)<br>"The overall framework of the process is relatively straightforward. Its structure is very clear, and there are no technical requirements or particularly strong professional background requirements" (B3)<br>"The process is very easy to grasp. There is nothing extensive to learn, and the entire operability is clear. In addition, the function is simple and easy to learn" (C1)<br>"Very easy, very simple, that is, you just get started on it" (D2)<br>"Easy to use" (D3) |
| Q5 | Most of the respondents give positive comments to the process and the online meeting, but also provide some suggestions | "The online meeting is simple and professional, but is it possible to have a voice chatting function? I think it will be more helpful to communicate some verbal information" (A1)<br>"I think it would be better to add a step to generate a record for the meeting specifically" (A4)<br>"I wish the leader could be more operational in the online meeting. For example, I can see the names of some proposal writers, but others can't, and it is not possible to shield some people in the voting steps" (C1)<br>"It will be better to make unified training for the leaders. This doesn't need much, only some of the difficulties and important points in the process" (D1)<br>"I wish the proposers' name could be hidden, which will improve fairness in the voting" (D2) |

**Table 3.**
Q1, Q2 and Q5 results

| Theme | Coding key words | Some examples of comments |
|---|---|---|
| Improve result quality | "Talk freely" | "Talk more freely which is conducive to generate a good idea" (A2) |
| | "More formal" | "This more formal form allows everyone to pay more attention to this project and think in a stricter way" (B2) |
| | "Score fairly" | "Results have good quality, since if everyone scores fairly the high score also represent the high quality of the idea" (B3) |
| Help make better decisions | "Evaluation" | "The evaluation is the most important, since it determines whether the final result is the most satisfying" (A3) |
| | "Clear score" | "For decision-making, this stuff is really very useful. The scoring is very clear" (B1) |
| | "More respectful" | "More respectful of everyone's opinions" (B2) |
| Build consensus | "Shared understanding" | "The process facilitates communication and exchange of different ideas which improves shared understanding" (A1) |
| | "Voting" | "The voting step can produce a consensus of the discussed issues" (A3) |
| Objective and democracy | "Comprehensive" | "Voting is also my favorite. We didn't use the ballot in the previous meeting since it is too much trouble. But I find that voting can take into account the views of everyone" (A3) |
| | "Voting" | "The voting link is more objective which can show whether the ideas are to everyone's liking. It is very clear" (D2) |
| | "Satisfaction" | "The link to vote is more objective, that is, the minority is subordinate to the majority. The satisfaction of the majority will be met" (D3) |
| Help improve leadership | "Clear goal" | "Outstanding leaders have clear goals in their minds, so this kind of meeting will be efficient" (D4) |
| | "Reasonable process" | "I think a reasonable process is part of the capacity of good leadership" (C3) |
| | "Participant" | "The leadership can improve member participation" (D1) |
| Participation | "Talk freely" | "Since everyone can talk freely, participation is high" (C1) |
| | "Voting" | "Voting sessions reflect the views of the majority, and acquires more democratic and scientific decision-making" (C4) |
| Help improve efficiency | "Concentration" | "This process could let us have better concentration" (A1) |
| | "Fixed process" | "Focus on a topic, with a fixed process; this will improve the efficiency" (D5) |
| | "Written words" | "It can avoid waste time in verbal meetings since the written record is very clear" (D2) |

**Table 4.**
Q3 and Q4 grouped answers

prevent inefficient phenomena such as the topic diverting from the issues being discussed or endless arguments. Although efficiency is not always of importance for some meetings to build relationships and trust (such as the meetings of the Youth Tennis Association), in other organizations (such as the Student Union), a more systematic process can help the leader to improve their leadership.

(2) The collaboration effectiveness of youth organizations is improved.

The collaboration process is also effective to build consensus of the plan, obtain high quality results and participation, and make improved, objective and democratic decisions. The youth organizations often consist of members with various backgrounds, which may make the discussion process chaotic. Moreover, the leader often finds it difficult to make a decision since each idea has its own pros and cons. The new process supported by the website can give an equal platform for everyone to show their preference, while the quantitative method gives the leader an objective measurement to get comprehensive results which can maximize everyone's satisfaction.

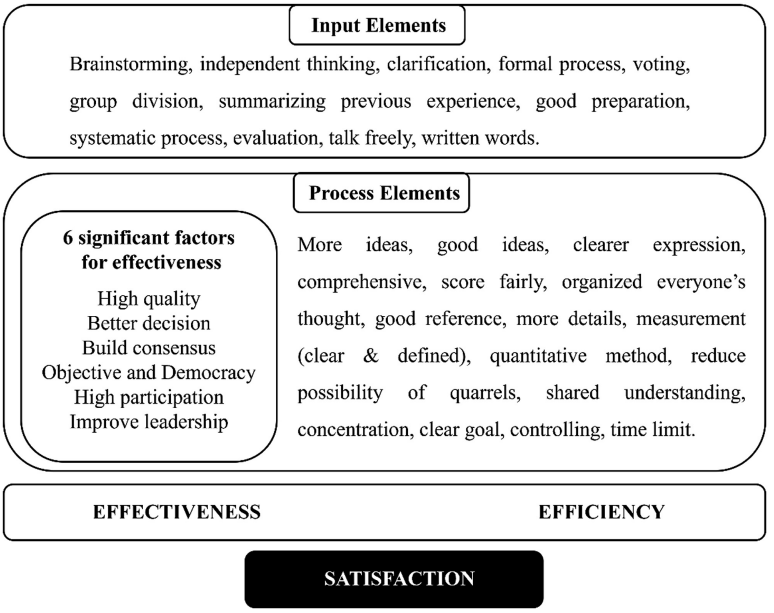



**Figure 3.**
Relationship hierarchy classification of influencing factors

(3) Some potential areas for improvement of the process design are noticed.

We first note that although the written words can help to make the description of ideas clearer, it will cause some verbal information loss which will likely lead to a reduction in effective communication. In addition, voice communication is more efficient than written communication. The flexibility in the design of a collaboration process should allow participants to choose and combine different media so as to express their opinions clearly, using visual as well as semantic representations (Saad & Maher, 1996; Jain *et al.*, 2019). Therefore, we suggest extensions to the process tools and allow voice input in a future design of the system. Furthermore, participants mentioned that the discussion results would sometimes be forgotten so it would be better to make a specific step to record the results, or include a support function in the online support system to record during a discussion.

## 7. Conclusion

In this paper, we developed a reusable and flexible process to support the effective and efficient collaboration of youth organizations, with the support of a GSS designed by the authors. We then tested the process among four different youth organizations, demonstrating positive results. Through analysis of our interview data, impacting factors of youth organizations' effectiveness and efficiency were figured out. Besides, we suggested several improvements to enhance the satisfaction of the participants.

### *7.1 Theoretical contributions*

This process design contributes to CE research for youth organizations, a field which still lacks relevant research and enriches the literature on solutions for youth organizations' collaboration under the impact of Covid-19. The primary theoretical contribution of this paper lies in the successful application of the design method, which is a combination of the CE

approach (Kolfschoten *et al.*, 2009; De Vreede & Briggs, 2019), thinkLets (Briggs *et al.*, 2006; Murray *et al.*, 2020), the FPM (Winkler *et al.*, 2022) and the ADF (de Vreede and Briggs, 2009; Hinrichs & Johnston, 2020), to solve the unique problems relating to youth organizations based on deep analysis of the characteristics of different youth groups. In our research, we have shown all the details to use the combined mode and successfully demonstrated the application of CE and GSS to substantially improve group effectiveness and efficiency (Ackermann, 1996; Fjermestad & Hiltz, 1999; Kolfschoten *et al.*, 2006; Lazareva & Munkvold, 2017). Furthermore, our collaboration research contributes to the small body of existing research on youth organization effectiveness and efficiency as well.

Our study also validated the four CORE conditions, demonstrating their importance for a youth organization to function effectively (Conyne, 1983) and made some new findings on the influencing factors of organizational effectiveness and efficiency. Firstly, democracy (Ostroff & Schmitt, 1993; Mehdipour & MohebiKia, 2019) and a shared understanding (Mathieu *et al.*, 2000; Gomes & Tzortzopoulos, 2018) play important roles in efficiency. In addition, new factors that can also improve effectiveness and efficiency of the youth organizations, such as concentration and control, group division and good preparation have been found in our research. We have also categorized the sub-factors of effectiveness into six groups: high quality, better decision, objective and democracy, build consensus, high participation and improve leadership. These could also provide a theoretical base for future collaboration among researchers according to their requirements for further adoption and development. We have concluded the early elements relating to relationships as well: brainstorming, voting, evaluation, independent thinking, talk freely, clarification, written words, formal (Systematic) process, group division, summarizing previous experience and good preparation. These should all be given careful consideration.

We also found a new relationship between the leadership and members of youth organizations. The primary focus of previous studies (Dormody & Seevers, 1994; Wingenbach & Kahler, 1997; Serrano *et al.*, 2021) has been on leadership as an individual skill, investigating how it works in or is gained from an organization. Our research has validated the two-way influence between a well-organized process and improvement in youth leadership. In addition, our research highlighted the relationship between the leadership and participation (Wingenbach & Kahler, 1997).

### *7.2 Practical implications*

From a more practical aspect, the application of GSS tool provides convenience for the collaboration of youth organizations and helps improve their effectiveness and efficiency, especially in today's post-pandemic era. In addition, the research has figured out the relationships among different influencing factors in the online collaboration process, thus the organizers or leaders of the youth organizations can better identify and improve the problems in collaboration, enhance the satisfaction of association operation and do good to the growth and innovation cultivation of youth; besides, based on this, we can build and improve the GSS platform in a better way; and the development and design of online meeting systems may draw some inspiration from it, remote collaboration and remote communication in the context of pandemic can also be promoted; the research may bring some enlightenment to social enterprises as well and enable them to make better use of facilitated process to carry out digital collaboration, laying the foundation for its digital transformation together with related business development, and ultimately, boost the development of today's digital economy and e-commerce.

### *7.3 Limitations and future research*

Nonetheless, some limitations have to be considered with respect to our research. First of all, this research mainly adopts qualitative research methods, and we will further carry out

quantitative research through questionnaire survey to verify and supplement the current results. Secondly, at present, the scenario of our research is relatively single and simple, whether the process design is able to ensure the durative effects in a daily meeting or a more complex overall project could not be proven, and this study is conducted in China, which may not be applicable and has not been tested for other contexts. In the future, we will expand the process to more kinds of organizations in consideration of different situations.

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(The Appendix follows overleaf)

## Appendix

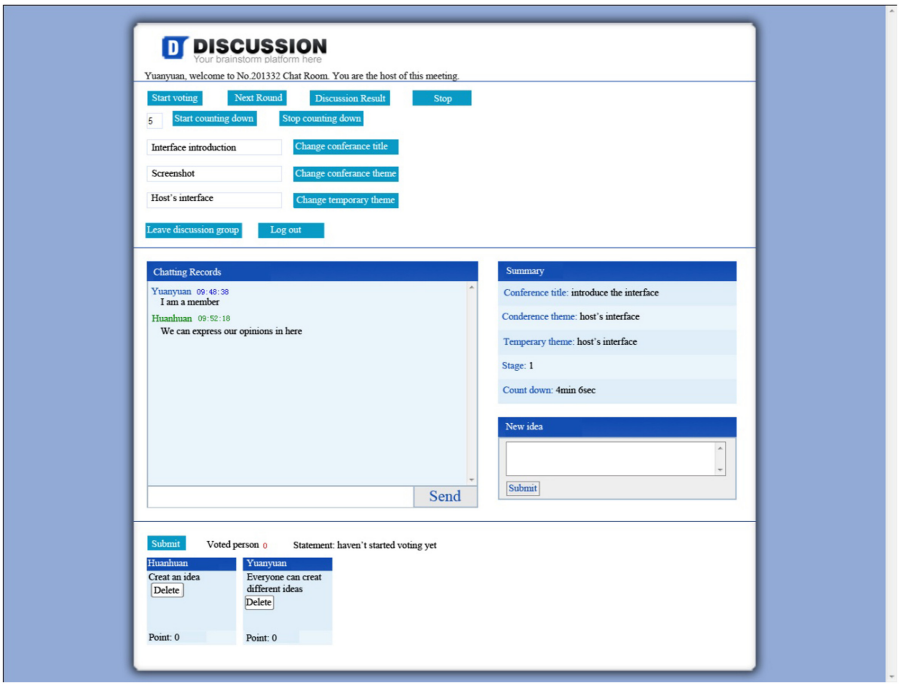


**Figure A1.**
The discussion interface of the leader

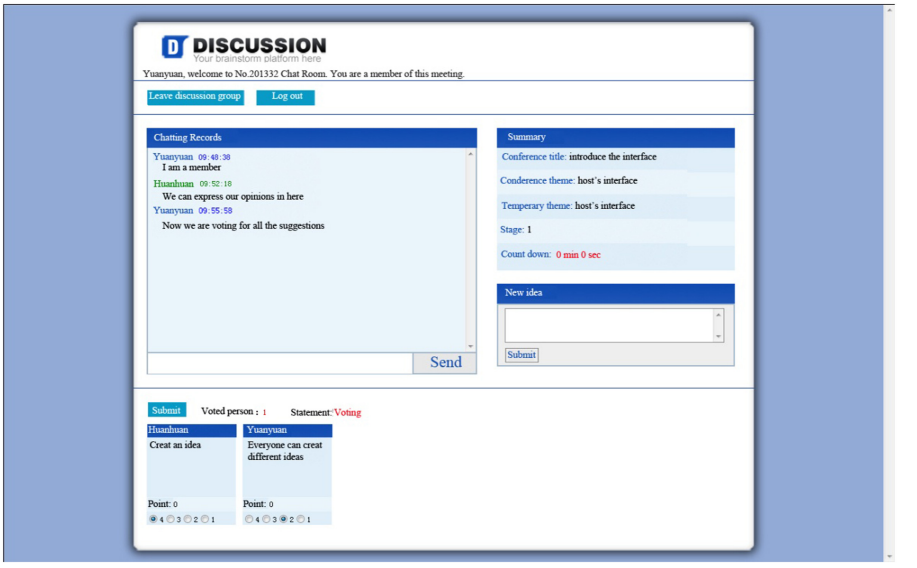


**Figure A2.**
The discussion interface of participants

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