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# The Study of Indonesian High School Students' Collaboration Skills: Student Self-Assessment

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**Abstract.** Collaboration skills are one of the most important skills in the 21st century. The concepts of collaboration skills include motivation, contribution, problem-solving, interaction with others, team support, preparedness, time management, team dynamics, reflection, role flexibility, and work quality. The purpose of this study was to describe the level of collaboration skills of high school/equivalent students in Indonesia. The instrument used was a CSAT (Collaboration Self-Assessment Tools) questionnaire totaling 11 categories. The instrument contains four answer choices in the form of questions about the collaboration skills category and open-ended questions. The questionnaire was distributed online via Google Forms to 325 students. Characteristics of students include those aged 15–18 years from various majors such as Science, Social Sciences, Languages, and others. Descriptive data analysis and simple coding. The results showed that 49% of the collaboration skills of high school/equivalent students in Indonesia were in the developing category, 40% were good, and 11% were emerging. Students' good intrapersonal skills include task quality and time management, while their good interpersonal skills involve contribution and interaction with others. In conclusion, students' ability to work together in teams has begun to evolve. Future research can develop various learning strategies and methods that can improve students' collaboration skills.

**Keywords:** Collaboration skill, interpersonal skills, intrapersonal skills, CSAT

## INTRODUCTION

One of the 21st-century talents that should be owned and developed by students is collaboration. Collaboration skills have a brief definition, namely the existence of two or more people working together to achieve certain goals (Cooper et al., 2022; Møgelvang & Nyléhn, 2023; Saldo & Walag, 2020). In learning, collaboration skills are crucial for students, especially in solving problems. Previous studies have developed various learning models that can help improve student collaboration, for example, problem-based learning, project-based learning, and so on. These models are also recommended by the Indonesian government in implementing the latest curriculum "Curriculum Merdeka" from elementary to high school.

In education, the term "collaboration" is utilized indiscriminately (Friend, 2000). Each school's purpose description seems to include collaboration in which every group that meets is labelled as a collaborative team, and every classroom with two educators in charge of instruction is dubbed collaborative (Palmer et al., 2016; Friend, 2000).

Collaboration has been suggested across audiences (parents, support staff, volunteers, student teachers), practices (conferencing, teaming, evaluating), and venues (school-university collaborations, school-business collaborations, school-agency partnerships) (Gladstone-Brown, 2008; Friend, 2000). However, simply speaking the term does not always imply carrying out the action. Collaboration necessitates each individual's dedication to a common objective, a particular focus on interaction skills, and participants maintaining parity throughout their conversations (Cook & Friend, 1995). Collaboration does not happen as a result of a requirement from the administration, pressure from peers, or political correctness (Friend, 2000) as well as by proclamation. Otherwise, it must emerge from a comprehension of its promise and hazards, and only be able to be perpetuated as a system-level norm via professionals' purposeful utilization of suitable skills and understanding (Friend, 2000). Therefore, the collaborative process is not always simply not present every time professionals meet, and this is not an unreasonable expectation.

Miyake demonstrated that in collaboration, some accidental division of labour can happen: the individual who has more to say about the current topic takes the task-doer's role, while the other becomes an observer, monitoring the situation." The spectator can participate by critiquing and making topic-divergent gestures, which are not the task-doer's major tasks." 174 (Miyake, 1986). Similar findings have been reported by O'Malley (1987) with couples attempting to comprehend the UNIX C-shell command interpreter. This role allocation is determined by the nature of the activity and may alter often (Dillenbourg et al., 1996). In computer-assisted tasks, for instance, the person who operates a computer mouse is known as the "executor," while the other is known as the "reflector." Collaboration and collaboration diverge not in whether or not the task is spread out, but in how it is divided: in collaboration, the task is divided (hierarchically) into independent subtasks; in collaboration, cognitive processes can be divided (heterarchical) into interconnected layers (Molina et al., 2009; Dillenbourg et al., 1996). Coordination is only necessary when constructing incomplete outcomes in collaboration, but collaboration is a coordinated, synchronous action that is the result 3 of a continuous endeavor to develop and sustain a common picture of an issue (Baker, 2015; Dillenbourg et al., 1996).

A difficult topic in educational research and practice is how to evaluate students' collaborative work in a way that supports constructive collaboration (Baker, 2015). Giving learners feedback on their achievements is an important part of teaching, but there is a catch-22 here: on the one hand, teachers must evaluate individual student skills, yet this cannot be done if assessment only concerns the product of collaboration; on the other hand, evaluating one's contribution to teamwork emphasizes individual contributions, potentially to the disadvantage of collaboration itself (Lenkauskaitė et al., 2020; Mandinach & Gummer, 2016; Baker, 2015). Collaboration involves more than just the joining or combining of distinct tasks; hence, judging each person's contribution from the total outcome will be difficult (Wilson & Daugherty, 2018; Baker, 2015). Personal and team evaluation (rating individual development based on individual examinations following collaboration, as well as the quality of the joint result) is typically used by teachers. Hinyard et al (2019) used the Self-Assessed Collaboration Skills (SACS) tool to measure student collaboration skills. SACS was piloted on students taking interpersonal education courses. The final SACS validation results obtained 11 item scales consisting of three dimensions of collaboration namely information sharing, learning, and team support.

On the other hand, Ofstedal and Dahlberg (2009) have developed a tool that so-called the Collaboration Self-Assessment Tool (CSAT) to measure collaboration skills in various fields. CSAT arose from a thorough examination of research in fields such as enterprise, medicine, information technology, and education, as well as the realization that there was not much knowledge accessible to help instructors understand, assess, and enhance their collaboration abilities. For the purpose of supporting effective interactions between teacher candidates and collaborating teachers, a group of teacher educators initiated the process of defining the fundamental elements of collaboration in educational settings. The

CSAT was created as a consequence of 18 months of development and refinement. The very first version of the collaboration tool was titled Collaborative Work Skills for Co-Planning and Co-Teaching, and it identified ten critical collaboration skills encompassing contributions, kaizen (continuous improvement), time management, representation, problem-solving, group process, interactions with others, role flexibility, reflection. The latest version of CSAT consists of 11 categories of collaboration skills, namely contribution, time management, problem-solving, team support, preparedness, team dynamics, role flexibility, quality of work, motivation, interactions with others, and reflection. The CSAT instrument is equipped with a rubric consisting of a scale of 1 – 4 (1 = not at all, 4 = to a great extent) and examples of collaboration in each of these categories.

In the CSAT developed, collaboration skills are classified into two categories: interpersonal skills and intrapersonal skills (Ofstedal & Dahlberg, 2009). Interpersonal skills are skills connected to interpersonal relationships, such as two-way communication and offering objective feedback (Stiehl et al., 2023; Ofstedal & Dahlberg, 2009). In contrast to intrapersonal skills, which are associated with an individual's internal qualities, such as self-confidence (Torsney et al., 2023; Carroll et al., 2022; Ofstedal & Dahlberg, 2009). Contribution, team support, problem-solving, team dynamics, and relationships with others are the interpersonal skills categories. Meanwhile, intrapersonal skills include motivation/participation, work quality, time management, preparedness, role adaptability, and reflection.

The CSAT instrument was chosen for this study because it has been well established and appropriate for measuring students' collaboration abilities. This instrument was written in English before being translated into Indonesian. However, little study has been conducted to date on the level of collaborative abilities among Indonesian high school/equivalent pupils. The context of this study is to determine the level of collaboration abilities among high school/equivalent students from diverse Indonesian sample schools. This questionnaire was successfully completed by 325 pupils from more than 20 schools with the help of teachers and colleague.

## RESEARCH OBJECTIVES

Collaboration skills are very important for students' futures. Students who are skilled at collaborating tend to share ideas in solving problems. This is the background for raising this topic. This research aims to determine the collaboration skills of high school/equivalent school students in Indonesia.

## METHODOLOGY

This research is descriptive qualitative research. Descriptive research is a research method that focuses research on observations and phenomena of certain populations or situations. This research aims to provide a comprehensive picture of the collaboration skills of high school students from various schools in Indonesia.

### Participants

This questionnaire was distributed to several samples of students from high school or equivalent. The distribution of students who filled out the questionnaire can be seen in Figure 1. The sample consisted of 325 students, accounted for 66% female and 34% male. Their age range is 15 years to 18 years. The largest sample came from the province of West Sumatra, namely 171 students, while the areas of Jakarta and East Java were only filled by 1 student each. They are from the first year (60%), the second year (30%), and the third year (10%). The backgrounds of the students' majors varied such as Science (49%), Social Sciences (13%), Languages (5%), undetermined (24%), and other majors (9%). It is noteworthy that students who do not have a major are in the first year. Since the Indonesian curriculum is currently changing the education system, students can therefore choose majors in their second year.


**Figure 1:** Distribution of students who filled out the questionnaire (Map source: https://www.worldatlas.com/maps/indonesia)

**Research Tools**

The instruments used were taken from the development of a collaborative self-assessment tool (CSAT) by Ofstedal and Dahlberg (2009). This instrument is very detailed and suitable for independently assessing students' collaboration skills. Initially, original instruments in English were translated into Indonesian before being distributed to students. In addition, the instrument includes open-ended responses about the reasons students chose these answers. CSAT is grouped into two major groups: interpersonal skills and intrapersonal skills. Intrapersonal skills are divided into 6 categories, namely motivation, quality of work, time management, preparedness, role flexibility, and reflection, while interpersonal skills are divided into 5 categories, namely contribution, team support, problem-solving, team dynamics, and interaction with others. CSAT scoring rubric on a scale of 1 to 4 (1 = not at all, 4 = to a great extent). These three categories are concluded based on each student's score (10-25: Collaboration skills are emerging, 26-34: Collaboration skills are developing, 35-44: Collaboration skills are established) with a maximum score of 44.

**Data Collection**

Data collection was carried out for nine consecutive days using Google Forms. The number of students who filled out the questionnaire from the first day to the last day accounted for 42 students, 68 students, 50 students, 21 students, 58 students, 4 students, 12 students, 56 students, and 14 students. Students are free to fill out a questionnaire during school hours or outside school hours. This is because there are several schools that do not allow their students to bring smartphones to school. There are several CSAT categories whose definitions are given in the Google form so that students are not confused when filling out the questionnaire.

**Data Analysis**

The data analysis was carried out in stages. The first stage is the analysis of data originating from the Google form, while the second stage is the analysis of the student's open-ended question transcript. Data is analysed automatically with Ms. Excel to produce relevant information in the form of tables and graphs. To make it easier to calculate the data, we carried out simple coding, especially on the answer scale, gender, major, and school origin. In the second stage, the researcher collected all student responses with Ms. Word and grouped them by category. In other words, each CSAT category has 325 student answers. The transcript is very helpful in making network items, as shown in Figure 3. This analysis is done manually with simple coding.

## RESULTS AND DISCUSSION

### Results

Table 1 illustrates the results of a study on collaboration abilities among high school/equivalent students from diverse samples in Indonesia. The CSAT yields unambiguous results on students' capacity to collaborate. Each category includes four scales ranging from 1 to 4. The number of scales received by each student is used to interpret the data. If the overall student scale is 10–25, it will indicate that their collaboration abilities are improving; 26–24 shows that their collaboration skills are developing; and 35–44 exhibits that their collaboration skills are already strong. The following table shows the proportion of outcomes for each category.

**Table 1:** Presentation on the development of collaboration skills of high school students (N=325)

| *No* | *Category* | *1 (%)* | *2 (%)* | *3 (%)* | *4 (%)* | *Mean* | *SD* |
|---|---|---|---|---|---|---|---|
| | **Intrapersonal** | | | | | | |
| 1 | Motivation | 10.2 | 28.6 | 41.2 | 20.0 | 2.71 | 0.901 |
| 2 | Quality of Work | 5.3 | 21.5 | 32.3 | 40.9 | 3.09 | 0.910 |
| 3 | Time Management | 5.2 | 11.1 | 40.6 | 43.1 | 3.22 | 0.841 |
| 4 | Preparedness | 7.7 | 22.5 | 41.5 | 28.3 | 2.90 | 0.899 |
| 5 | Role Flexibility | 20.3 | 17.2 | 28.3 | 34.2 | 2.76 | 1.129 |
| 6 | Reflection | 11.7 | 11.7 | 44.0 | 32.6 | 2.98 | 0.955 |
| | **Interpersonal** | | | | | | |
| 7 | Contribution | 8.0 | 20.6 | 25.8 | 45.6 | 3.09 | 0.988 |
| 8 | Team Support | 5.2 | 30.8 | 37.5 | 26.5 | 2.85 | 0.873 |
| 9 | Problem Solving | 5.2 | 22.8 | 43.4 | 28.6 | 2.95 | 0.850 |
| 10 | Team Dynamics | 18.2 | 30.8 | 33.8 | 17.2 | 2.50 | 0.980 |
| 11 | Interaction with others | 2.5 | 12.0 | 23.1 | 62.4 | 3.46 | 0.799 |

According to Table 1, The scale percentage (1-4) with the highest percentage is derived from many criteria. The area of role flexibility received the highest proportion (20.3 %), while interaction with others received the lowest percentage (2.5%). The areas with the highest percentages in scale 2 (30.8%) are both team support and team dynamics, while time management has the lowest number (11.1%). The category with the highest percentage in scale 3 (44%) is reflection, whereas the one with the lowest number (23.1%) is interactions with others. Most students (62.4%) picked scale 4 (interactions with others), while the least people (17.4%) chose team dynamics. The engagement with others category has the highest average, at 3.46. As a result, the most popular student collaboration abilities are those that involve connecting with others.

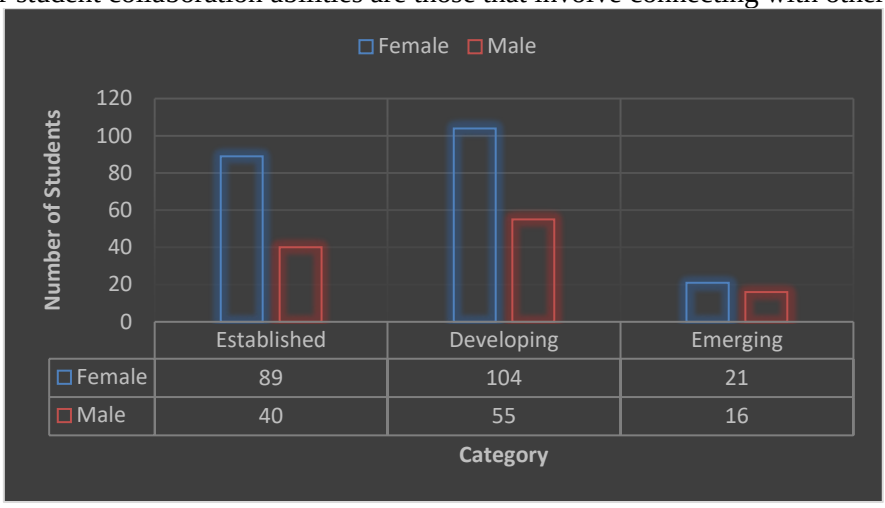


**Figure 1:** The development of high school student collaboration based on gender

Figure 2 depicts the findings of a gender poll on student collaboration skills. The level of student collaboration abilities is classified into three categories: established, developing, and emerging. Student collaboration skills are mostly in the developing stage (49%). While pupils in the established group are 9% smaller than those in the developing category. Only 11% of pupils still perform at the lowest level of teamwork. That is, the instructor must provide additional instruction to these kids in order to increase their teamwork abilities. In the developing category, male and female students have nearly identical collaboration skills. Overall, high school students' teamwork abilities are still growing and may be enhanced.

**Discussion**

An analysis of student collaboration skills was performed by distributing self-assessments, namely the CSAT. This questionnaire contains eleven categories of collaboration skills, i.e., motivation, contribution, role flexibility, time management, team support, reflection, team dynamics, problem-solving, preparedness, interaction with others, and quality of work. Each category is given four forms of statements containing possible student answers. Students are asked to fill in the reasons after choosing one of these options. This strengthens the results of the student collaboration skills survey. There are three groups of student skill levels: emerging, developing, and established. In general, students' intrapersonal skills that were found to be good were task quality and time management, while students' interpersonal skills that were found to be good were contribution and interaction with other people.

The ability mastered by students is interaction with other people. Many realise that the ability to interact with friends is needed, especially when completing projects. In accordance with this meaning, humans are social creatures (Lima de Miranda & Snower, 2020; Moghtader & Shamloo, 2019). Each member needs suggestions, ideas, criticism, information, experiences, and solutions from other members. Complex problems will become easier when solved together. This is in agreement with the opinion of Heller and Heller (1996), who believe that the purpose of group problem-solving is that each individual contributes a strategy to find solutions to problems. Interaction and communication skills also play an important role so that misunderstandings do not occur (Hinner, 2017).

Interactions between members can result in the sharing of ideas or opinions. Collaboration skills are closely related to contribution skills because contribution itself is part of that skill. The learning process is meaningful when students are able to apply concepts to solve problems. For example, in a STEM project, at least four students are experts in the respective fields of science, technology, engineering, and mathematics. That is, each student has a clear role so that they remain active in learning. Students who become leaders can be replaced as members, and vice versa. Perhaps this ability has not emerged among many students. This is evidenced by the survey results in Figure 2, which show that the role flexibility category is still developing.

Based on the results of preliminary observations by Santoso et al. (2021), the collaboration skills of high school students from three schools in East Java are still relatively low. Zhuang et al. (2008) summarised five concepts of collaboration/teamwork skills, including 1) process skills such as solving problems, making plans, and making decisions together; 2) skills in working together between teams and being able to adapt; 3) providing support; 4) resolving disagreements; and 5) role flexibility. Student collaboration skills are good if this concept has become a habit for students. But in fact, there are still high school students who are not confident in expressing opinions, are not active in learning, do not contribute anything to their groups, and so on. This can be seen from the results of open-ended questions where some students convey their weaknesses in learning in groups. The Indonesian government has realised the importance of collaboration skills for students. The proof is that learning from elementary to secondary levels must be project-based (Wasimin, 2022).

Students are given the option to submit further feedback on their collaborative abilities using the Google form. This can aid in reading pupils' minds, particularly when it comes to collaborative projects. The categories on the right side are related to interpersonal abilities, and vice versa. The categories on the left side are related to intrapersonal abilities. CSAT open-ended questions provide a network of connected concepts (see Figure 3). Collaboration skills are grouped into two main parts, namely interpersonal and intrapersonal skills. In general, students already understand the meaning of these categories. Each category contains several terms, ranging from 7 to 16 terms.

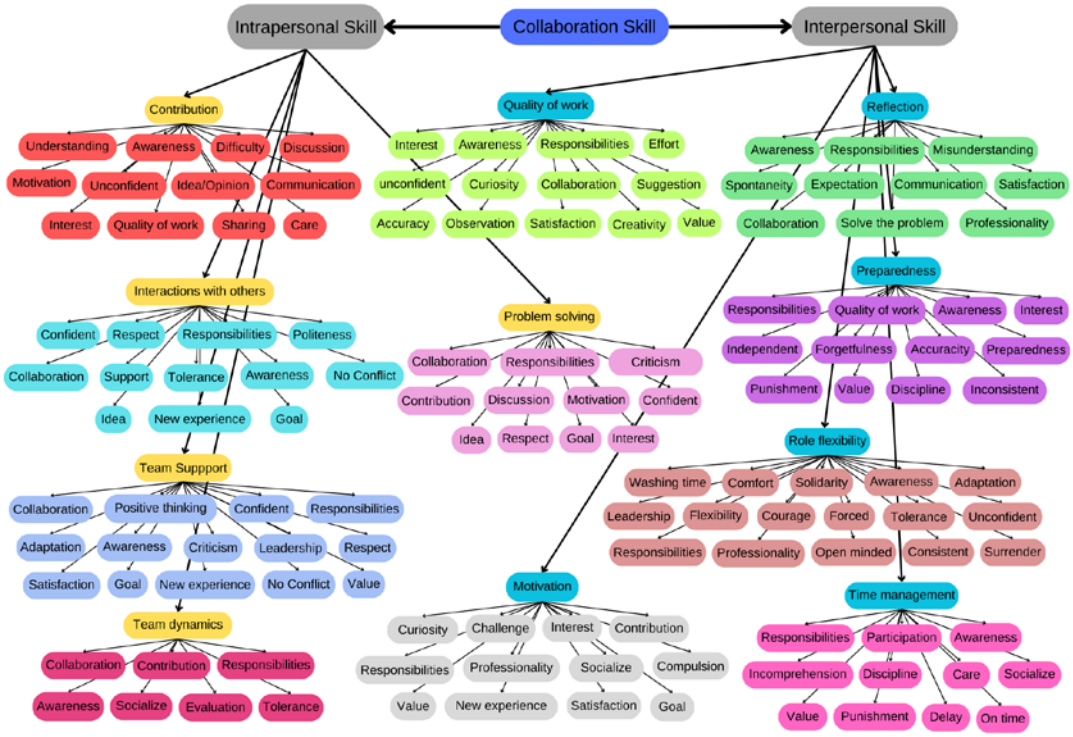


**Figure 2:** Themed results of the open-ended responses

*Reflection*

Reflection is giving an opinion, both input and criticism, about the actions that have been taken. In learning, students can do self-reflection to see the development of their collaboration skills in a group (Weinberg et al., 2021). Self-reflection aims to align actions, character, and abilities (Rashidova et al., 2023; Travers et al., 2015). Students generally say that reflection is related to awareness, responsibility, misunderstanding, spontaneity, hope, communication, satisfaction, collaboration, problem-solving, and professionalism. Self-reflection provides an opportunity for students to introspect themselves so that they become better (Rashidova et al., 2023).

"*I tend to be more conscious of self-reflection when things are not going well*"

*Quality of Work*

According to Gallie (2023) the quality of work can be emphasized in terms of employees, objectives, and implications. First, quality of work emphasizes what employees need at work. Second, quality of work emphasizes reasons for improving employee skills. Third, the quality of work focuses on psychological well-being and health. In learning, students need to be aware of their responsibilities in carrying out tasks that have been arranged by the group leader (Bubb & Jones, 2020). There are students who realize that it is important to discuss subjects with friends, especially those that are less interesting. This aims to improve the quality of the task.

*“It is a task that maybe I am not interested in, so it needs more effort to improve its quality. So, every time I finish this assignment, I will do more research on what I have done.”*

*Role Flexibility*

Role flexibility is the ability to change roles from leader to member (Borko et al., 2017; Ofstedal & Dahlberg, 2009). This ability can be taught to students during group discussions; they get the role of chairman, and on other occasions, they may just become members. According to Cooper (2005), leaders should master social communication to entertain their subordinates. In line with the opinion of students, good leaders are those who are able to direct their members.

*"A leader does not mean a chairman; a good leader is one who can communicate and direct his group. Sometimes that is how I feel”*

*Motivation*

Motivation usually appears when the field is in demand (Zou et al., 2021). However, always being involved in group activities, even if they are not very interested, is good motivation (Ofstedal & Dahlberg, 2009). At school, it is rare for students to like all subjects. Student opinion polls show that they are still trying to understand the task they are responsible for, even though the task is not of interest. Another opinion states that being involved in a project that is less desirable can add new experiences.

*“I am not only not interested, but I do not understand the task in a particular field. I still try to get involved and understand the task”.*

*Time Management*

The keyword for time management is to ensure that the tasks for which you are responsible have been completed and do not need the help of others (Ofstedal & Dahlberg, 2009). This shows that they have good time management. In fact, time management is one of the problems students face in tertiary institutions (Pedroso et al., 2022). Student opinion polls state that time management is related to discipline in submitting assignments because it greatly affects their grades.

*"Because assignments are important for increasing grades, and I do not want my grades to be low just because of assignments that I did not do because I was not disciplined in time. So, I always try to complete my assignments on time."*

*Preparedness*

Readiness of students to work on a given project. Good preparation will reduce the risks that will occur, for example, the needs of groups left behind at home. A high level of preparedness can increase student motivation (Prijambodo & Lie, 2021). Many students say that they have to bring the things needed for a project because it is their own responsibility.

*“I bring the materials needed and am always ready to make assignments because I have to be responsible, so I do not look for those materials again.”*

*Contribution*

Students are expected to be able to share ideas and information on certain tasks (Ofstedal & Dahlberg, 2009). This is in line with the opinion of some students in which contributions can improve project quality because students share knowledge and opinions. In fact, the contribution of students to learning is a positive activity apart from being present and doing assignments (Bowden et al., 2021). So, they are aware that contribution is important in learning activities, especially in groups.

*"Giving each other ideas or information while working on a project may, in my opinion, produce good results for these projects."*

*Problem-solving*
Students are expected to be active in finding solutions to problems given by the teacher. According to Heller and Heller (2001), the benefits of solving problems in groups are that problems that look complex can be solved together, and students are free to convey appropriate strategies to solve these problems. Many students state that problem-solving is important to find a solution to a problem and is a good form of communication with various ideas. Problem-solving is one of the 21st-century skills (Szabo et al., 2020).

*"I am happy to provide ideas and opinions to discuss in order to get solutions to problems and accept other people's opinions without reproach."*

*Team Support*
Each member is responsible for the group's needs (Ofstedal & Dahlberg, 2009). Students state that team support is done to avoid conflict and achieve common goals. Another opinion says that conducting group discussions requires responsibility and leadership. There are students who are aware of giving criticism to group projects for the sake of group success, even though at first, they are not used to it.

*"Because when I am in a new environment, it is difficult for me to adapt, let alone criticize. But if it really is to be criticized, I will venture to question the success of a group."*

*Interaction with others*
In interacting with other people, we should speak clearly, carefully, and professionally (Binkley et al., 2012). Many students think that when interacting with friends, it is better to have a good attitude, such as respecting their opinions. In other words, respect for others can take the form of listening, saying thank you, and providing support for their efforts (Ofstedal & Dahlberg, 2009).

*"I respect my friends, and I always pay attention to the efforts they make. Because it is important for people to respect us too."*

*Team Dynamics*
Group dynamics is believed to be an important part of sports psychology because it can represent changes, actions, and processes that occur within and between groups (Reyes-Hernández et al., 2021). Overall, team dynamics relate to the contributions made to achieve common goals. This is in line with the student's opinion poll about their awareness of inviting friends who are not yet active in discussions.

*"I often pay attention to team dynamics and encourage team members who were not active before. But there were also times when I was too focused on the end result of the project or task and ignored the less positive team dynamics".*

## CONCLUSION AND IMPLICATIONS

This research completely examines the collaboration skills of high school students in Indonesia. In collecting data, students assess themselves according to the indicators mentioned. This assessment is a self-assessment of collaboration skills as a formative assessment. The research results showed that 49% of the collaboration skills of high school/equivalent students in Indonesia were in the developing category, 40% were good, and 11% were emerging. These three categories are concluded based on each student's score (10-25: Collaboration skills are emerging, 26-34: Collaboration skills are

developing, 35-44: Collaboration skills are established) with a maximum score of 44. Overall, students have achieved collaboration skills on the indicators of interacting with other people, while the team dynamics indicators have not been mastered by students. Based on the results of open responses, students realized that it is important to carry out good collaboration such as sharing ideas, solving problems, taking roles, and so on.

Collaboration skills are not only needed by students in learning. However, students who are used to collaborating will use their abilities in the workplace later. One of the requirements needed in the world of work is being able to collaborate in a team. Therefore, students are expected to master collaboration skills since school. The results of this research provide a general picture of the profile of Indonesian students' collaboration skills at high school/equivalent level. The findings of this research can contribute to further research and teachers to develop learning models/approaches that can train students' collaboration skills.

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