Teachers’ perspectives toward soft skills in science learning

Susilawati1,3, N Aznam2, Paidi3 and Ngadimin4
1Department Educational Science, Universitas Negeri Yogyakarta, Daerah Istimewa Yogyakarta, 55281, Indonesia
2Department of Chemistry Education, Universitas Negeri Yogyakarta, Daerah Istimewa Yogyakarta, 55281, Indonesia
3Department of Chemistry Education, Universitas Negeri Yogyakarta, Daerah Istimewa Yogyakarta, 55281, Indonesia
4Department of Physics Education, Universitas Syiah Kuala, Banda Aceh, 23111, Indonesia

Email: susila@unsyiah.ac.id

Abstract. Soft skills are the essential attribute which has significant impacts on students’ achievement. This research aimed to investigate science teachers’ perception related to the importance of soft skills for the student, the components of soft skill needed in science learning and the challenges of soft skills improvement in science learning. By the purposive sampling, 100 science teachers from junior high schools were investigated. Survey method was used to collect the data and the analysis was conducted using descriptive-statistical analysis. The result showed 34% science teachers’ believe soft skills are critical factors for productive performance. Twelve components of soft skills which were needed in science learning are critical thinking, teamwork, creative and innovative, communication, problem solving, curiosity, rigorous, integrity, analysis, research and inquiry, information literacy, and objective. Data express the percentage difference in each component of soft skills. The finding revealed embedded and integrated are the significant methods in enhancing students’ soft skills. Lack of teachers’ understanding and learning resources and school principals’ support become the challenges in developing students’ soft skills. The study recommends developing an appropriating model or strategy in promoting soft skills.

1. Introduction
Soft skills are skills that are closely related to intrapersonal abilities. Personal ability determines the success of individuals in conducting a profession. Many studies have shown that the component of soft skills is an essential variable in today’s workplace [1-4] as communication skills, integrity, social skills, positive attitudes and teamwork [5]. Therefore, producing graduates with qualified soft skills is the responsibility of the teacher. [5] mentioned that students’ soft skill abilities need to be strengthened so that they are better prepared in facing work challenges.

Soft skills cannot be learned without practice and habitation in daily activities. However, in its implementation, there are still many obstacles that cause failure in fostering soft skills for students and various factors cause this. The integration of soft skills in learning to be less effective because teachers hardly find the right strategies and methods in developing soft skills in learning activities [3]. The process of internalizing soft skills in learning is complicated without the appropriate method and
approach for students in the school [6]. Therefore, it is necessary to identify methods of developing soft skills that have been applied by teachers, especially in science learning.

This is also in line with the goals of 21st century science education. 21st century education objectives want to increase students’ scientific literacy abilities, thus requiring teachers to master these competencies to develop the learning material and student abilities. Based on the 2015 PISA indicators, scientific literacy competencies cover three aspects, namely identifying scientific issues, explaining scientific phenomena and making scientific conclusions. These three competencies have indicators related to soft skills.

Science learning aims to build scientific literacy [7]. This is in line with government’s expectation in PP No. 19 of 2005 regarding of National Education Standards, science learning has scope to recognize, respond, appreciate, understand science, develop scientific thinking habits such as critical and creative thinking, be independent, and have a positive attitude. Scientific literacy is also very essential to be mastered by prospective science teachers to be able to understand various things related to the science context so that they can teach students [8]. The context of science is closely related to the environment, health, economy, and other problems in this modern society, which is very dependent on the technology and knowledge of public science.

The components of scientific literacy are scientific clarification, explaining phenomena scientifically, using scientific evidence and willingness to engage in science issues. These components produce skills related to soft skills including: communication skills, argumentation, critical decision making and problem solving. So that, the integration between soft skills and scientific literacy produce indicators that reflect the two competencies [8]. Therefore, the application of these indicators as a reference in soft skill-based learning becomes essential to improve students' soft skills [9]. Based on these conditions the researcher deems it necessary to explore the teacher’s understanding of the importance of soft skills, the components of soft skills needed in learning science, the soft skill integration strategy and the obstacles in applying soft skills.

Various abilities are expected to emerge in students after learning science. This ability can be cognitive, affective and psychomotor. This demand is a challenge for science teachers. In science learning activity, students are expected to have a high sense of curiosity towards new things to be learned. Consequently, science teachers are required to be able to create an atmosphere of learning that stimulates students' curiosity about new things. Science teachers are also required to be able to assist students in expressing ideas and communicating their scientific ideas. So that, communication skills that are part of soft skills must be able to be mastered by students [10]. Therefore in studying science, students are required to have soft skills that are also in line with the scientific literacy component. So that through the mastery of soft skills students are expected to be able to fulfill scientific literacy abilities, in accordance with the objectives of science learning.

However, in practice, at this time teachers do not have an understanding related to the components of soft skills associated with science learning activities. So that researchers feel the need to explore information about the components of soft skills needed by science teachers in learning. In addition to the soft skills component, this study also explained the results of a survey related to the soft skill development methods applied by science teachers so far. So the results of this study are expected to be input for teachers to integrate the components of soft skills needed in learning in accordance with the objectives of 21st century science education. This study also provides information about methods that can be done in developing soft skills. The recommendations generated in this study are beneficial for the development of science learning based on soft skills in accordance with 21st century science education goals.

2. Method
The research was a survey using a structured self-administrated mailed questionnaire to teachers who teach science for more than three years. The teachers are from junior high schools in 4 provinces which are Aceh, North Sumatra, Central Java and Yogyakarta. The questionnaire was filled by 100 science teachers from 160 the total number of questionnaires distributed. Purposive sampling was employed.
The questionnaire consisted of 20 items, including 5 items of demographic information and 15 items related to soft skills needed in science learning.

3. Result and discussion
Based on the questionnaire, the result showed science teachers believed that soft skills are the crucial component for students. They strongly agree 83.5% to promote students’ soft skills since school age and 15.7% agree start it in elementary school. Even, the rest advocated the development of soft skills that had begun before entering school age. The following is a description of the study result related to science teachers’ perception.

3.1. The importance of soft skill for student
To explore the opinions of teachers about the soft skills for students, researchers provide open-ended questions so that teachers are free to give their opinions on the virtues of soft skills. So based on these answers, researchers get a picture of the function and role of soft skills for students based on the perspective of science teachers. According to the result, the researcher classifies the description of the answer into five categories.

Table 1. Shows that most science teachers (34%) believe that soft skills are a determinant of student academic success. Based on the answers given by science teachers to the importance of soft skills, it is obtained the view of teachers who believe soft skills can be supporting skills to improve students’ performance. This result in line with [11] said soft skills improvement influence a students’ academic performance. Most of the teachers believe soft skills components such as; problem solving, critical thinking, creative, and teamwork are crucial in enhancing students’ understanding of the learning material conversely, students who do not have good soft skills will be constrained in learning activities. As stated [12] soft skills of students affect student learning abilities, especially in interacting with the environment at school.

| NO | The important of soft skills for students                                                                 | (%) |
|----|--------------------------------------------------------------------------------------------------------|-----|
| 1  | Soft skill needed to promote students’ achievement                                                      | 34  |
| 2  | Soft skills as the important attribute to promote students; character, personality, religious and attitude in interact with the people in social community. | 26  |
| 3  | Soft Skills as the crucial factor in promoting students’ successful in the future life                   | 19  |
| 4  | Soft skill becomes a main requirement in todays’ workplace and a readiness deal with challenges in globalization era. | 17  |
| 5  | The others                                                                                             | 4   |

A side from supporting academic achievement, soft skills also have a role in running interactions with the surrounding environment. Science teachers’ perception reveals the attributes of soft skills influencing social interaction with others. 26% of them consider soft skills as a basis for students' character, personality, attitude and religious. Students' skills in communicating, collaborating, disciplining and responsibility are decisive in building interactions with the environment.

In addition, soft skills are also seen as the determination of students’ success in the future [13]. Science teachers believe that the independence and readiness in facing future challenges are influenced by the soft skills of students. One of the challenges in the future is the skills needed in the workplace. 17% of science teachers believe that soft skills are a major requirement in the workplace. In addition, soft skills as the fundamental skills to face the challenges in the globalization era. [14] mentioned that soft skills are the main skills needed for employment. So students need to be equipped with soft skills as capital in getting a job [15].
3.2. The components of soft skill needed in science learning

The results shown in table 2 show the respondents' perception on soft skills components that are needed by students in science learning. Generally, all components of soft skills are considered to be highly needed by students in science learning. According to the percentage score the data reflect critical thinking is the most component needed in science learning.

![Figure 1. Soft skills components in science learning.](image)

According to figure 1, the data reveal 12 components of soft skills which are needed in science learning. Based on the percentage score, the components are critical thinking, teamwork, creative innovative, communication, problem solving, curiosity, rigorous, integrity, analysis, research inquiry, information literacy and objective. These attributes are applied in science learning activities.

This is in accordance with the characteristics of learning science that requires analytical skills, critical thinking, creative, research and inquiry and solve problems from existing natural phenomena. In addition, science learning also teaches students to be able to read, make, interpret and explain data in the form of pictures, graphs and tables. Communication skills are also an important part of learning science. Communication in science is different from other communications. Formulate scientific communication or so-called scientific communication in science in the form of verbal communication, and writing in expressing ideas clearly and systematically supported by relevant facts and data. In science learning a student is supposed to argue a data with scientific argumentation. The argumentation is not a claim but an idea which is supported by accurate data and based on fundamental theory. This finding is in accordance with [16] who states that the soft skills components such as argumentation, communication, problem solving, and critical thinking are needed in learning science.

3.3 The appropriateness method in integrated soft skills in science learning

Soft skills will develop optimally if it is taught through the right methods and strategies. Various strategies can be done in integrating soft skills, Figure 2 shows science teacher’s perception about the effective strategy in integrating students' soft skills.
The result indicated five strategies in integrating soft skills. Most teacher (92.2%) recommended integrated learning as the effective method to improve students' soft skills. Through integration in science lessons, students can develop soft skills in line with learning objectives. This strategy will help students improve knowledge, attitude and psychometrics. The integrated approach through multiple level curriculum is one of the best ways to develop soft skills that are needed by students [11,17].

In accordance with the data in figure 2, activities in social community (78.3%) as an alternative strategy to teach soft skills. By interacting with other people, students have to have a good ability in communication, teamwork, integrity, and etc. The skills applied in social interaction will give the impact on students' personality in the future [18]. As a social creature, human is unable to live lonely without community. Then, social live will exercise students to enhance social skills.

In enhancing soft skills, students need a model as an example which invites, guides the role and mimics the skills exemplified so as to be able to master the skills correctly. Science teachers consider a modeling approach (67.8%) is a strategy to promote soft skills. In this strategy, the science teacher has to be a role model for students. So students can see firsthand an example of the application of soft skills in learning activities and social interactions in school. The percentage of a modeling strategy is close to extracurricular activities (64.3%). Science teachers believe by following the activities of school organizations students can develop soft skills. Interaction activities among students in following extracurricular activities supposed to develop students' soft skills. Besides, the conventional teaching method is believed to be 24.5% of science teachers as the strategy for developing soft skills. Although not much, the teacher considers learning activities that have normally taken place in class become the method to improve soft skills.

3.4 The challenges of soft skills improvement in science learning.
Figure 3 reveals science teacher perception about the challenges in soft skills improvement. The problems classify into four categories which showed in the following chart.

![Figure 3. Soft skills integration challenge.](image-url)
According to figure 3, the data shows that teachers’ lack understanding of soft skills becomes a big challenge. Overall, this challenge is the highest percentage which is 63.5%. Although teachers knew the definition of soft skills, they did not yet understand the methods of applying and integrating soft skills in learning science. So, the data shows that 56.5% of science teacher is not accustomed to integrating soft skill components in learning. Most of the teachers are difficult in integrating soft skills into teaching materials and evaluation tools. This condition effects the slack of the improvement of soft skills. [19] mentioned the absence of evaluation procedures, and standard tools in evaluating the success rate of soft skills education that has been provided.

In line with the results, the study reveals 56.5% of science teachers said soft skills are not listed in learning objectives. Most of scholars neglect soft skills as learning purpose. The achievement of hard skills has to be accompanied with soft skills as an important factor in today’s workplace. In addition, the lack of supporting from schools’ principals (43.5%) became the obstacle to promote students' soft skills. Supporting from schools' principal and parents becomes the crucial in enhancing soft skills. The improvement of soft skills will increase significantly if fully promoted by school supplies, facilities such as teaching material and evaluation.

4. Conclusion

Science teachers' perception of soft skills reveals various phenomena encountered in developing soft skills. Generally, teachers understand the function and virtue of soft skills for students, but they are not totally understand the application of soft skills in science learning. The important of soft skills, mostly science teachers believe soft skills are needed to promote students’ achievements, character, personality, religious and attitude in interacting with the people in social community. There are 12 components of soft skills needed in science learning. The attributes from high percentage are critical thinking, teamwork, creative and innovative, communication, problem solving, curiosity, rigorous, integrity, analysis, research and inquiry, information literacy, and objective. Related to the strategy for developing soft skills, the study reveals five components which are integrated in the learning process, social activities, a modeling approach, extracurricular activities and conventional teaching methods. The challenges of soft skill development are the lack of teachers' understanding of soft skills and teaching materials, soft skills are not listed into objective learning and the last one is lack of support in soft skill development. The study recommends to develop teaching models that will facilitate teachers in integrating soft skills in learning. The availability of appropriate learning tools can also help to promote soft skills in science learning.

Acknowledgement

The researcher wants to say thanks for the ministry of finance, especially for Indonesia Endowment Fund for Education (LPDP), which supported financial in conducting research.

Reference

[1] Loughry M, Ohland M W & Woehr D J 2014 Assessing teamwork skills for assurance of learning using CATME team tools Jour of Marketing Educ 36 5
[2] Tang K N, Chan C T and evi U 2015 Critical issues of soft skills development in teaching professional training: educators’ perspectives Proc Social and Behavioral Sci 205 128
[3] O’Neill T A, Hoffart G C, McLarnon M J W, Woodley H J, Eggermont M, Rosehart W and Brennan R 2017 Constructive controversy and reflexivity training promotes effective conflict profiles and outcomes in student learning teams The Acad of Manag Learning and Educ, 16 257
[4] Donia M B L, O’Neill T A and Brutus S 2018 The longitudinal effects of peer feedback in the development and transfer of student teamwork skills. Learning and Individual Differences 61 87
[5] Robbles M M 2012 Executive perceptions of the top 10 soft skills needed in today's workplace Business Communication Quarterly 75 453
[6] Waddock S & Lozano J M 2013 Developing more holistic management education: Lessons learned from two programs. *The Academy of Management Learning and Education* 12 265

[7] OECD 2015 PISA 2012 Results: PISA 2012 Results: What Students Know and Can Do - Student Performance in Reading, Mathematics and Science. OECD Vol 1 (Publishing, Paris-France)

[8] Bybee R W & Trowbridge L W 1996 *Teaching Secondary School Science Strategies For Developing Scientific literacy* Englewood (New Jersey: Merrill an Imprint of Prentice Hall)

[9] Udompong L, Traiwichitkhun D & Wongwanich S 2014 Causal model of research competency via scientific literacy of teacher and student *Procedia Social and Behavioral Sciences* 116 1581

[10] Tang K N 2018 The importance of soft skills acquisition by teachers in higher education institution *Kasetsart Journ of Soci Sciences* 30 1

[11] Ritter B A, Small E E, Mortimer J W and Doll J L 2018 designing management curriculum for workplace readiness: developing students’ soft skills *Journal of Management Education* 42 80

[12] Greenberg A D & Nilssen A H 2015 *The role of education in building soft skills: Putting into perspective the priorities and opportunities for teaching collaboration and other soft skills in education* [Online] available: https://www.google.ca/ [10 Juni 2019]

[13] Setiawati I & Nurlaelah I 2017 analisis profil kemampuan berargumentasi guru dan mahasiswa calon guru dalam pembelajaran biologi menggunakan model toulmin’s argumen pattern (TAP) dan upaya perbaikannya *Quagga* 9 1907

[14] Widhiarso W 2009 *Evaluasi Soft skills dalam Konteks Pembelajaran* [Online] available: http://widhiarso.staff. ugm.ac.id/h-39/soft-skills- mahasiswa.html [28 Juni 2019]

[15] Sutikno S, Dita E R and Rahmat H 2010 Pentingnya soft skill terintegrasi dalam kehidupan perkuliahan dalam rangka mengurangi pengangguran dan menyoongsong era pasar bebas bagi mahasiswa universitas negeri malang [Online] available: http:// kemahasiswaan.um.ac.id/ [17 Juni 2019]

[16] Tang K N N, Nor H H and Hashimah M Y 2015 Novice teacher perceptions of the soft skills needed in today’sworkplace *Procedia Social and Behavioral Sciences* 177 284

[17] Subramaniam I 2013 Teachers perception on their readiness in integrating soft skills in the teaching and learning *journal of Research & Method in Education* 2 19

[18] Susilawati & Intan S W 2019 Pembelajaran fisika berbantukan media sosial facebook dan dampaknya terhadap hasil belajar fisika *Jurnal Pendidikan Fisika UM Metro* 7 1

[19] Tama M S W S, Suprapti M, Wartini P and Widyatmika 2009 Pengembangan evaluasi soft skills mahasiswa melalui proses pembelajaran (PHK-I: Universitas Udayana)