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Collaborative skills of prospective teachers in laboratory activities related to the concept of elasticity

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Abstract. The collaborative is a skill needed in facing challenges and opportunities in the era of industrial revolution 4.0. Therefore, universities must prepare prospective graduates to have collaborative skills. The purpose of this study was to describe collaborative skills that are trained and developed through laboratory activities. This study used descriptive quantitative methods. The research sample amounted to 250 teacher candidates from several Islamic Universities in Indonesia. The sampling technique used random sampling, which represents Islamic universities on four islands in Indonesia. The research instrument used was a performance assessment supplemented by a rubric of assessment. The results of research prospective teacher collaboration skills were a good category. Thus, laboratory activities can train and develop collaborative skill skills of prospective teachers.

1. Introduction

The 21st century has brought a positive change to the learning paradigm. Today's global developments demand that students be able to study and work collaboratively with individuals from diverse cultures, religions, ideologies, and lifestyles in an environment of openness and mutual respect [1]. Collaborative skills can be called interpersonal skills [2]. Collaborative skills have been linked to future economic prosperity for individuals and countries, as they provide the key qualities necessary to succeed in global skill competitions [3,4]. Collaborative skills are considered important for future labour [3].

State Islamic University and Institute of Islamic State of religion as part of the Institute of Educators and Education (LPTK) who prepare prospective teachers to have the role of preparing graduates who can compete in the era of globalization. Prospective physics teachers must master the



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skills of the 21st century. 21st-century skills that need to be trained and developed by LPTK in preparing prospective teachers to face opportunities and challenges in the era of Revolution 4.0 industry including learning and innovation skills consisting of 4 aspects, namely thinking skills Critical, creative thinking, communication, and collaboration [5-8].

21st-century skills can help students to learn and adapt to all forms of change occurring over time [9,10]. This change is related to the mechanisms of economic development, environmental and political ecosystems globally. This condition requires students to learn to communicate, collaborate, and resolve 4 problems with people around the world. Students require seven skills for survival including critical thinking and problem solving, leadership and collaboration, dexterity and adaptability, vigorous initiative and entrepreneurship, the ability to communicate effectively both oral and written, easy access to information and information analysis, imagination and curiosity [9,12].

Collaborative skills can be trained and developed in classroom and laboratory learning. Laboratory activities are an integral part of the teaching and learning activities of physics that can inspire motivation and performance of learning physics; develop basic skills of experimenting; become a learning vehicle to apply scientific methods; develop high-level thinking skills; provide practical capabilities; rides confront student preconception [13-17]

Laboratory activities oriented to the investigation conducted in groups potentially develop collaborative skills. Laboratory activities offer prospective teacher students to solve collaborative problems in collaboration. Laboratory activities undertaken in collaboration can improve individual performance, make it easier to achieve common goals, improve teamwork, synchronicity, explicit coordination, and implicit coordination [18]. 31

Elasticity topics are an important part of the basic physics course taught in the physics education program. Understanding the concept of elasticity material is very important to master by students. Physics phenomena related to the topics of elasticity are found in everyday life. Students can study a variety of phenomena related to elasticity can be used as a valuable experience to communicate concepts that have been learned. The concepts associated with elasticity include Hooke's law and its application, application of the arrangement of series and parallel of spring.

2. Methods

The research method uses quantitative descriptive. Sampling techniques using random sampling. The research sample consists of students of physics teacher candidates who spread at 4 state Islamic religious colleges on 4 islands consisting of 250 students of physics teacher candidate. 13 The research site was conducted in physics education study Program IAIN Palangka Raya, UIN Alauddin Makassar, UIN Imam Bonjol Padang, and UIN Sunan Gunung Djati Bandung. Research instruments use a collaborative skills observation sheet with scoring criteria of 1-3. Observation of the retrieval of research data involves 20 observers. Each observer performs an observation of 1 group consisting of 5 students of physics teacher candidates. Collaborative skills data collection techniques are conducted by observing the laboratory activities related to elasticity topics. Aspects of collaborative skills assessed are the results of the modification include 7 aspects consisting of actively contributing in the group, working collaboratively with different types of people, responsible for completing tasks, solving problems, showing respect for friends or teams, working together, accepting advice and mutual decisions and research techniques [19,20]. Data on collaborative skills of collaboration are analysed and described using scale criteria consisting of very less good, less good, good enough, good and very good. Every collaborative aspect that students achieve is calculated and aggregated and then presented in value. The interpretation of the 28 percentage achievement of every aspect of the student's collaborative skills is guided on the criteria shown in Table 1 [21].

Table 1. Category of achievement student collaboration skills.

Interval percentage	Category
$80 < X \leq 100$	Very good
$60 < X \leq 80$	Good
$40 < X \leq 70$	Enough
$20 < X \leq 40$	Less
$0 < X \leq 20$	Too Less

3. Results and discussion

The collaborative skills of physics teacher students in four Islamic religious colleges were assessed by observers using observation sheets. Observer assesses students' collaborative skills during laboratory activities. The observation results for students' collaborative skills are shown in Table 2.

Table 2. Achievement student collaboration skills of every university.

Islamic Religious College	Average	Percentage	Category
IAIN Palangka Raya	15.28	72.75	Good
UIN Alauddin Makassar	16.12	76.76	Good
UIN Imam Bonjol Padang	15.86	75.51	Good
UIN Sunan Gunung Djati Bandung	16.30	77.62	Good

Student collaboration skills of physics teacher candidates on physics laboratory activities related to elasticity in four Islamic religious colleges including the good category. Student collaboration skills UIN Sunan Gunung Djati Bandung reaches the largest percentage in the good category. The student collaboration skills of IAIN Palangka Raya reached the lowest including a good category compared to other Islamic religious college.

These results following the demands of the 21st-century learning framework demanding prospective physics teachers possess skills, knowledge, and skills in technology, media, and information, learning skills, and innovation, as well as life skills and including collaborations. The 21st-century learning paradigm emphasizes the ability of students to find out from a variety of sources, formulate problems, and conduct analytical thinking and collaboration and collaborations in solving problems. Everyone should have critical thinking skills, knowledge, and digital literacy skills, information literacy, media literacy and Master of Information and communication technology.

The collaboration skills of students in each Islamic religious college are also analysed based on the achievement of each indicator. The achievement of each indicator of student collaboration skills is shown in Table 3.

Table 3. Achievement of each indicator of student collaboration skills at each university.

Islamic Religious College	1	2	3	4	5	6	7
IAIN Palangka Raya	2.22	2.11	2.26	2.30	2.26	2.17	1.96
UIN Alauddin Makassar	2.35	2.23	2.28	2.35	2.39	2.39	2.13
UIN Imam Bonjol Padang	2.10	2.24	2.24	2.26	2.33	2.33	2.36
UIN Sunan Gunung Djati Bandung	2.29	2.42	2.52	2.39	2.26	2.30	2.16
Average	2.24	2.25	2.33	2.32	2.31	2.30	2.15
Percentage	74.65	75.02	77.51	77.44	76.95	76.57	71.79
Category	Good	Good	Good	Good	Good	Good	Good

Description: 1. Actively contributing to the group; 2. Work with different types of people; 3. Responsible for completing tasks; 4. Solve the problem; 5. Respect for a friend or team; 6. Cooperate, receive shared advice and decisions; and 7. Investigation techniques.

Student collaboration skills indicators of physics teacher candidates in every Islamic religious college overall in the good category. Indicators responsible for completing the task reach the highest percentage including the good category. The lowest percentage achievement occurs in the research technique indicators including the good category.

The students' skills are responsible for completing the task of demonstrating the collaboration that is based on the knowledge that has been given to solve ¹⁰ problem. Students contribute to each other in the form of thought and cooperation. Collaboration is an interactive, constructive, and knowledge-based process, involving many participants together in problem-solving activities to achieve the desired objectives [22,23]. Collaboration is one of the social interactions that are formed in a society that is much needed by students of prospective teachers when they graduate [24].

The investigation techniques are essential for the physics teacher's student. The success of laboratory activities is not detached from the correct investigation techniques. Each student of a physics teacher has a relatively heterogeneous research technique skill. The difference in research technique skills among prospective physics teachers is due to students' experience in solving problems through laboratory activities, student creativity, physics content mastery, and mastery of Information technology to search for learning resources. Active individual contributions in the group demonstrate the collaboration skills that the physicist students have. Collaborative skills can improve students' social commissar's such as assisting behaviours in investigations, involving information exchanges and establishing academic self-concepts [25,26]

The results of this study were following previous research showing that collaborative skills affect learning and retention of student knowledge [27-29]. Collaborative problem solving has a difference in individual problem-solving. Collaborative learning has an advantage over effective work sharing; combining information from a variety of knowledge sources, perspectives, and experiences; increased creativity and quality of solutions stimulated by the ideas of other group members [3].

4. Conclusion

The skills of collaborative teacher candidate Physics in four Islamic religious colleges can be developed and trained through laboratory activities with an average of reaching above 72% in good categories. This suggests that prospective physics teachers have the potential to compete globally. The Indicator is responsible for resolving the problem of reaching the highest percentage in the good category. The lowest percentage occurs in the investigation techniques indicator. Thus, laboratory activities can improve the skill of collaboration of physics teacher candidates.

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References

- [1] Pacific Policy Research Center 2010 *21st Century Skills for Students and Teachers* (Honolulu: Honolulu: Kamehameha Schools, Research & Evaluation Division)
- [2] National Research Council 2011 *Assessing 21st century skills* (Washington, DC: National Academies Press)
- [3] OECD 2015 *Programme for International Student Assessment (PISA)*
- [4] Battelle for Kid 2019 *Partnership for 21st Century Learning* [Online]. Available: <https://www.battelleforkids.org/networks/p21/frameworks-resources>
- [5] Kingsley T 2015 Gamification: Questing to integrate content knowledge, literacy, and 21st-century learning *J. Adolesc. adult Lit.* **59** 51--61
- [6] Häkkinen P, Järvelä S, Mäkitalo-Siegl K, Ahonen A, Näykki P and Valtonen T 2016 Preparing

- teacher-students for twenty-first century learning practices (prep 21): a framework for enhancing collaborative problem-solving and strategic learning skills. *Teach. Teach. Theory Pract.* 1–17
- [7] Scott C L 2015 *The Futures of Learning 2: What Kind of Learning for the 21st Century?*
- [8] Trilling and Fadel 2009 *21st Century Learning Skills* (San Francisco: John Wiley & Son)
- [9] Aoun J E 2007 *Robot-Proof: Higher Education in the Age of Artificial Intelligence* (United State: MIT Press)
- [10] Ongardwanich N, Kanjanawasee S and Tuipae C 2015 Development of 21st century skill scales as perceived by students *Procedia - Social and Behavioral Sciences* pp 737–41
- [11] Saavedra A R and Opfer V D 2012 Learning 21st century skills requires 21st century teaching *Phi Delta Kappan* **94** 8–13
- [12] Qian M and Clark K R 2016 Game-based learning and 21st century skills: A review of recent research *Comput. Human Behav.* **63** 50–8
- [13] Malik A, Setiawan A, Suhandi A, Permanasari A, Dirgantara Y, Yuniarti H, Sapriadi S and Heminta N 2018 Enhancing communication skills of pre-service physics teacher through hot lab related to electric circuit *J. Phys. Conf. Ser.* **953** 012017
- [14] Malik A, Setiawan A, Suhandi A, Permanasari A, Samsudin A, Dirgantara Y, Suhandi I and Hermita N 2019 The development of higher order thinking laboratory (hot-lab) related to heat transfer topic *J. Phys. Conf. Ser.* **1204** 012060
- [15] Hofstein A and Lunetta V N 2003 The laboratory in science education: foundations for the twenty first century *Sci. Educ.* **88** 28–54
- [16] Susantini E, Thamrin M H and Lisdiana L 2012 Pengembangan petunjuk laboratorium genetika untuk melatih keterampilan berpikir kritis *J. Pendidik. IPA Indones.* **1** 102–8
- [17] Srisawasdi N and Kroothkeaw S 2014 Supporting students' conceptual development of light refraction by simulation-based open inquiry with dual-situated learning model *J. Comput. Educ.* **1** 49-79.
- [18] Chiochio F, Grenier S, O'Neill T., Savaria K and Willms J. 2012 The effects of collaboration on performance: a multilevel validation in project teams *Int. J. Proj. Organ. Manag.* **4** 1–37
- [19] Siahaan P, Suhandi E and Kaniawati I 2017 No Title *J. Penelit. Pengemb. Pendidik. Fis.* **3** 167–74
- [20] Annisa A I 2018 *Pengembangan Instrumen Penilaian Keterampilan Kolaborasi dan Hasil Belajar Kognitif Fisika Peserta Didik SMA melalui Kerja Lapangan Berbasis Kearifan Lokal* (UNY)
- [21] Sari K, Prasetyo Z and Wibowo W 2017 Development of science student worksheet based on project based learning model to improve collaboration and communication skills of junior high school student *J. Sci. Educ. Res.* **1** 1–6
- [22] Hartono E 2004 *Knowledge, technology and inter-firm collaboration: a model and empirical study of collaborative commerce* (University of Kentucky, Lexington)
- [23] Bedwell W., Wildman J., DiazGranados D, Lazzara E., Shuffler M. and Xavier L 2009 What is collaboration? A multidisciplinary review *4th Annual Conference of the Interdisciplinary Network for Group Research Colorado Springs*
- [24] Huang D, Leon S, Hodson C, La D, Obregon T N and Rivera G *Preparing students for the 21st century: Exploring the effect of after school participation on students' collaboration skills, oral communication skills, and self-efficacy* (Los Angeles)
- [25] Ginsburg-Block M D, Rohrbeck C A and Fantuzzo J W 2006 A meta-analytic review of social, self-concept, and behavioral outcomes of peer-assisted learning *J. Educ. Psychol.* **98** 732–49
- [26] De Dreu C K. and Weingart L. 2003 A contingency theory of task conflict and performance in groups and organizational teams', in M.A. West, D. Tjosvold and K.G. Smith *International Handbook of Organizational Teamwork and Cooperative Working*, pp 151–66
- [27] Fall R, Webb N and Chudowsky N 1997 *Group Discussion and Large-Scale Language Arts Assessment: Effects on Students' Comprehension.*

- [28] Rojas-Drummond S and Mercer N 2003 Scaffolding the development of effective collaboration and learning *Int. J. Educ. Res.* **39** 99–111
- [29] Saner H, McCaffrey D, Stecher B, Klein S and Bell R 1994 The effects of working in pairs in science performance assessments *Educ. Assess.* **2** 325–38

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