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Self-Efficacy, Collaboration, Communication, and Problem-Solving Skills of Islamic Pre-Service Teachers Based on Gender and Grade Levels

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Abstract:
This study aims to explore university students' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) based on gender and grade levels. The type of research used is quantitative research with a survey method. Five hundred students (300 females and 200 males) were selected by random cluster sampling. In a cross-sectional survey design, data were collected using the SE and CCS questionnaires, the PSS test, and interview guidelines. Quantitative data analysis applied the MANOVA test at a significance level of .05, while the Patton analysis technique was employed to analyze data from interviews. The study comes up with several interesting findings: 1) females have higher levels of SE, CCS, and PSS than males; 2) gender-based differences of SE, CCS, and PSS among students did exist, yet no differences were identified on grade levels; 3) SE, CSS, and PSS differences based on gender and grade levels occur simultaneously; 4) gender factor has significant effects on PSS; and 5) there were no SE, CCS, and PSS differences among freshmen, sophomores, and junior students. The survey findings were confirmed by findings from interviews, where female students have higher self-confidence, problem-solving and communication skills, and cooperation than male students, and no SE, CCS, and PSS differences were identified among freshmen, sophomores, and junior students. The novelty of this research is to analyze the self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) of students based on gender and grade levels.

Keywords: self-efficacy, collaboration and communication skills, problem-solving skills, gender, grade levels.

基于性别和年级水平的伊斯兰职前教师的自我效能、协作、沟通和解决问题的能力

摘要：
本研究旨在根据性别和年级水平探讨大学生的自我效能感（东南）、协作和沟通能力（CCS）以及解决问题的能力（PSS）。使用的研究类型是采用调查方法的定量研究。通过随机整群抽样选择了 500 名学生（300 名女性和 200 名男性）。在横断面调查设计中，使用东南和 CCS 问卷、PSS 测试和访谈指南收集数据。

定量数据分析采用多元方差分析检验，显着性水平为 0.05，而巴顿分析技术用于分析访谈数据。该研究得出了几个有趣的发现：1）女性的东南、CCS 和 PSS 水平高于男性；2）学生的东南、CCS 和 PSS 存在性别差异，但未发现年级差异；3）东南、CSS、PSS 基于性别和年级的差异同时出现；4）性别因素对 PSS 有显着影响；5）大一、大二和大三学生的东南、CCS 和 PSS 没有差异。调查结果得到访谈结果的证实，女学生比男学生具有更高的自信心、解决问题和沟通能力以及合作能力，并且在大一、大二和大三之间没有发现东南、CCS 和 PSS 差异学生。这项研究的新颖之处在于根据性别和年级水平分析学生的自我效能感（东南）、协作和沟通能力（CCS）以及解决问题的能力（PSS）。

关键词：自我效能、协作和沟通能力、解决问题的能力、性别、年级水平。

1. Introduction

Pre-service teachers in the 21st century must have cognitive competencies and develop soft skills to compete in the Industrial Revolution 4.0 era. The learning skills students should master include self-efficacy, problem-solving skills, critical thinking skills, scientific attitudes, and collaboration and communication skills (Sanabria & Jesús, 2017; Sumardi & Wahyudiati, 2021). However, multiple studies validate that development of self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) in higher education was mostly neglected, resulting in the students' low SE, CCS, and PSS skills (Villafane & Lewis, 2016; Wahyudiati, 2021a, 2021b; Zeidan & Jayosi, 2015). The above situation demands that educators and educational institutions modify learning practices to develop 21st-century skills at all educational levels.

Development of SE, CCS, and PSS skills is highly required to enhance and upgrade prospective teachers' competencies in terms of soft skills. These skills include scientific attitudes, self-confidence, problem-solving skills, critical thinking, and collaboration and communication skills (Wahyudiati et al., 2020). For this reason, it is very important to develop soft skills as learning outcomes, especially at the university level (Wahyudiati, 2021a, 2021b; Fadli & Masnun, 2020). These skills have been mostly neglected in the learning process owing to more focus on students' cognitive achievements. Lack of soft skills development has resulted in low self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) at primary, secondary, and tertiary levels (Curseu et al., 2017; Sumardi et al., 2020; Fadli & Irwanto, 2020; Ismiani et al., 2017).

Self-efficacy is defined as students' beliefs and confidence in their abilities to perform assigned tasks (Wahyudiati et al., 2020). Collaboration and communication skills (CCS) are teamwork skills to collaborate and communicate better to work effectively to achieve the desired objectives (Wahyudiati, 2021a, 2021b). Meanwhile, problem-solving skills refer to analyzing, identifying, and formulating problems and problem-solving alternatives and proving hypotheses to solve certain problems (Irwanto et al., 2019; Fadli, 2021). Moreover, the problem-solving skills of prospective teachers are highly required and relevant with the skills to apply fact- and context-based knowledge, as an effort to train skills for solving problems and developing a career in the Industrial Revolution 4.0 era. However, studies focusing on self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) among students are still very limited and rather focus more on scientific attitudes and cognitive achievements (Wahyudiati et al., 2020). Moreover, simultaneous measurement of self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) have never been conducted. For this reason, more studies that measure prospective teachers' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) at the university level are highly requisite.

Students' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) must be developed to be able to achieve learning objectives that cover affective, cognitive, and psychomotor domains. However, the factual condition of learning practices in Indonesian higher educational institutions as per empirical studies substantiates that learning processes focus more on conceptual mastery than the development of attitudes, soft skills, and psychomotor aspects (Fadli & Irwanto, 2020; Irwanto et al., 2019; Sumardi et al., 2020). The findings of the empirical studies reveal that learning issues at universities were teacher-centered learning with monotonous methods and a lack of application of scientific methods in the learning process. Findings of previous studies also show that learning methods and strategies, use of innovative technologies, and learning environment very significantly influence increased self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) of the students (Fadli, 2019; Irwanto et al., 2019). As such, improvement of learning quality needs multiple innovative learning strategies and models for teaching that must certainly be supported with increased lecturer's competencies (Wahyudiati et al., 2020; Wahyudiati et al., 2019a, 2019b).

Past studies reveal a relevance between self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) based on gender and grade levels. The fact has been confirmed by studies of Wahyudiati et al. (2020), Irwanto et al. (2019), and Fadli (2019), which show that students' self-efficacy

(SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) differ based on gender and grade levels. Studies in different countries support this fact, and their findings have mapped the current state of self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS). However, no research focusing on investigating the three aspects simultaneously based on gender and grade levels has ever been conducted in Indonesian universities. For this reason, it is urgently necessary to map the factual condition of self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) of prospective teachers in Indonesia from gender and grade level perspectives.

2. Method

The research employed a cross-sectional survey design (Creswell, 2018), in-depth focus group interviews (FGIs). To support and strengthen quantitative data from questionnaires, focus group interviews were conducted to collect qualitative data. The advantages of cross-sectional survey design are that it can measure relationships or correlations between two or more variables and interpret the factual situation and condition of the research object.

Concerning the research urgency and contributions, the researchers believe that its findings will map out the factual condition of prospective teachers' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) simultaneously, which has never been done to date. Furthermore, the benefits of the research include: 1) as a reference in mapping out the factual condition of prospective teachers' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS); 2) as a reference in planning and implementing learning activities that can develop prospective teachers' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS); 3) development of prospective teachers' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) will result in enhanced quality and competencies of the prospective teachers. The objective of the research was to identify differences in self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) among prospective teachers based on gender and grade levels.

The research employed a cluster random sampling technique (Fowler, 2002). The samples were collected at three universities, totaling 500 prospective teachers, comprising junior students (32%), sophomores (34%), and freshmen (34%); 40% females and 60% females (Table 1). The research sample came from the Islamic religious education department with an age range of 19-22, and this research was conducted from October to December 2020. When the survey was conducted, all samples were willing to respond according to the research needs. Focus group interviews involved 10 lecturers with a minimum of 5 years of teaching experience and 200 students, who were determined based on the deep interview technique (Creswell, 2018). The samples to be interviewed were selected based on the cluster representation of each respondent's high, medium, and low scores, which aimed to confirm quantitative research findings.

Table 1. Demographic characteristics of the research sample

Grade Levels	Female	Male	Total
Junior (3rd grade)	100	70	160
Sophomore (2nd grade)	110	60	170
Freshman (1st grade)	100	70	170
Total	310	190	500

The data were collected consecutively through surveys. The first phase was the distribution of a questionnaire on self-efficacy, collaboration and communication skills, and assessment of problem-solving skills at the three universities. The next phase was interviews based on the results of analysis of the quantitative data by employing the deep interview technique. The questionnaire on self-efficacy, collaboration and communication skills, and problem-solving skills test were distributed to junior students, sophomores, and freshmen at the three universities for three months. Focus group interviews involved 10 lecturers, and 20 volunteer participants represented each grade. In total, 10 lecturers and 60 students participated in the focus group interviews conducted by the researchers and research assistants.

The self-efficacy instrument was adopted from the Research Self Efficacy Scale (RSS). The RSS instrument consists of 35 question items with four indicators: a person's belief in his/her ability to carry out a task, confidence in formulating and identifying problems, confidence in determining problem-solving methods, and confidence in reporting findings. This RSS questionnaire consists of 5 scales. The answer scale is composed of the options "do not agree completely" (1), "do not agree" (2), "undecided" (3), "agree" (4), "agree completely" (5). Based on the validation results, the alpha coefficient value was 0.87, and the reliability coefficient was 0.85, so the instrument was declared feasible and valid.

The problem-solving skills (PSS) instrument was adopted from the PSET instrument, consisting of four indicators: the abilities to understand problems, prepare plans, implement them, and evaluate the results. Based on the validation results, the alpha coefficient value was 0.90, and the reliability coefficient was 0.88, meaning that the instrument met the reliability test standards.

The research instrument used to measure student collaboration skills is a questionnaire adapted from an instrument developed by Zakiah et al. (2020), which consists of five indicators: cooperation ability, cohesiveness, scientific attitude, presentation skills, and compiling reports. Based on the validation results, the alpha coefficient value was 0.89, and the reliability coefficient was 0.90, so the instrument was valid.

Before application, the instruments had to undergo validation in terms of construct validity and face

validity involving seven content and language experts. After the expert validation and declaration of the instrument validity, an empirical test on 50 respondents to measure the instrument reliability level was carried out. The next phase was focus group interviews to collect qualitative data to support quantitative data. The interviews employed guidelines that had been declared to be valid by expert validation tests for contents and language. The participants of the focus group interviews included 10 lecturers and 60 students, selected based on their readiness to participate in the FGI, where their identity was disguised. The in-depth FGI was used to give freedom to the participants to express their opinions so that others would understand the reasons for the opinions expressed (Creswell, 2018).

Data collected from the research were analyzed in two phases. In the first phase, quantitative data from the questionnaire on self-efficacy, collaboration and communication skills, and problem-solving skills test was analyzed with MANOVA test to measure correlation and relationships of two or more variables (Hair et al., 2010). Prior to employing the MANOVA, the MANOVA prerequisite test was carried out, which resulted in Levene's test value of $p > 0.05$ (data being homogenous) that meets MANOVA's assumptions. Likewise, the normality test resulted in $p > 0.05$, indicating that data were distributed normally. The multicollinearity test resulted in VIF = 0.40 (no multicollinearity). Next, the scatter plot matrix linearity test showed a positive correlation between each variable pair. In the second phase, data from interviews were categorized and arranged in repeating patterns or themes regarding Patton's qualitative analysis (2002) that refers to data collected from focus group interviews. The main reason for taking Patton's technique was to ensure the repeating patterns collected are relevant to the research objectives that would support the quantitative data gathered earlier. Moreover, Patton's technique may help identify and analyze the emergence of unanticipated elements during interviews. As such, qualitative data supported quantitative data.

3. Findings

Identification of students' self-efficacy (SE) level, collaboration and communication skills (CCS), and problem-solving skills (PSS) based on gender and grade levels used deviation standard values and average scores as shown in Table 2. Results of data analysis show students' SE score was the highest, followed by CSS and PSS. The highest mean scores were found on female and freshman grade students for SE in the amount of 47.800 (Table 2). For CSS level, female junior grade students have higher scores than male students in junior, sophomore, or freshman grades. In addition, the highest PSS level in male students was found at sophomore grade compared to female students; however, the lowest PSS level was found lowest in female students of freshman grade at a value of 24.325. For exploring the quantitative findings further, the data collected from questionnaires were supported by findings from interviews (described in the Discussion section).

Table 2. Mean scores of SE, CCS, and PSS based on gender and grade levels

	Gender	Grades	Mean	SD
Self-Efficacy (SE)	Male	Freshman	43.400	5.44
		Sophomore	44.600	6.08
		Junior	45.920	4.98
	Female	Freshman	47.800	2.78
		Sophomore	45.325	6.53
		Junior	44.400	5.61
Collaboration and Communication Skills (CSS)	Male	Freshman	27.533	1.77
		Sophomore	27.533	1.77
		Junior	26.600	2.86
	Female	Freshman	27.300	2.65
		Sophomore	27.825	2.11
		Junior	27.800	2.18
Problem-Solving Skills (PSS)	Male	Freshman	24.325	3.54
		Sophomore	24.675	3.54
		Junior	25.600	3.35
	Female	Freshman	25.760	3.33
		Sophomore	25.833	3.40
		Junior	26.833	2.65

The results of the MANOVA indicate that there are differences in SE, CSS, and PSS scores based on gender with $p < 0.05$ (Table 3), meaning that the alternative hypothesis was accepted. However, no differences were identified in SE, CSS, and PSS values based on grades with $p > 0.05$, meaning that the null hypothesis was accepted. Furthermore, the results of the MANOVA analysis show an interesting finding where there were differences in SE, CSS, and PSS based on gender and grade levels simultaneously with $p < 0.05$, indicating that the null hypothesis was rejected.

Table 3. The results of MANOVA for students' SE, CCS, and PSS based on gender and grade levels

Effect		Value	F	Sig.
Gender	Pillai's Trace	.102	7.276	.000
	Wilks' Lambda	.898	7.276	.000
	Hotelling's Trace	.114	7.276	.000
	Roy's Largest Root	.114	7.276	.000
Grades	Pillai's Trace	.019	.630	.707
	Wilks' Lambda	.981	.626	.709
	Hotelling's Trace	.020	.623	.712
	Roy's Largest Root	.011	.721	.540
Gender*Grades	Pillai's Trace	.107	3.646	.002
	Wilks' Lambda	.893	3.727	.001
	Hotelling's Trace	.120	3.808	.001
	Roy's Largest Root	.117	7.556	.000

Data analysis was subsequently followed by a test of between-subjects effects to identify differences between the factors and dependent variables. The findings show no differences in SE, CSS, and PSS based on grade levels since $p > 0.05$ (Table 4). On the contrary, there were differences in gender for the PSS aspect with $p < 0.05$, yet no SE and CSS differences were identified among the students with $p > 0.05$. Next, there were differences in students' SE and PSS based on gender and grade levels simultaneously with $p < 0.05$; contrarily, there were no differences in the CCS aspect

since $p > 0.05$.

Table 4. The results of the test of between-subjects effects on SE, CCS, and PSS

Effect	Dependent Variables	F	Sig.
Gender	SE	2.445	0.120
	CCS	2.215	0.138
	PSS	20.504	0.000
Grades Level	SE	0.253	0.777
	CCS	0.948	0.389
	PSS	0.470	0.626
Gender*Grades	SE	4.988	0.008
	CCS	2.123	0.122
	PSS	5.153	0.007

The differences in SE, CSS, and PSS among grade-level categories were determined based on Tukey's HSD multiple comparison test results. The results of Tukey's HSD test show that no differences in SE, CSS, and PSS were identified among freshman, sophomore, and junior grades since $p > 0.05$ (Table 5) for all aspects measured.

Table 5. The results of multiple comparison tests on SE, CCS, and PSS based on grades

Dependent Variables		Grades	Grades	Sig.
Self-Efficacy (SE)	Tukey's HSD	Freshman	Sophomore	.582
			Junior	.619
		Sophomore	Freshman	.582
			Junior	1.000
		Junior	Freshman	.619
			Sophomore	1.000
Collaboration and Communication Skills (CCS)	Tukey's HSD	Freshman	Sophomore	.639
		Sophomore	Junior	.955
		Junior	Freshman	.629
			Junior	.480
			Freshman	.955
			Sophomore	.980
Problem-solving Skills (PSS)	Tukey's HSD	Freshman	Sophomore	.833
		Sophomore	Junior	.903
		Junior	Freshman	.833
			Junior	.992
			Freshman	.903
			Sophomore	.992

The findings of quantitative research are strengthened by the qualitative findings obtained based on the interview results as follows:

Female students' interests and motivation in doing their academic assignments are generally higher than those of male students, which further positively impacts their academic achievements (I.01).

I always do my best and get serious in working on my academic and practice-class assignments, hoping for maximum outcomes (I.03).

I find it difficult to work on practice-class assignments, so I feel less motivated to do them. This results in my academic achievements that are not optimum yet (I.05).

Learning activities in the initial semesters focused more on conceptual knowledge and less on developing students' soft skills. As a result, my academic performance in terms of attitude and psychomotorics did not improve (I.02).

I feel less motivated to work on my academic assignments since the learning methods employed by the lecturers are relatively similar in the first and second years. As a result, my academic achievements are not maximum (I.06).

4. Discussion

The findings show that those female students have higher levels of self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving skills (PSS) than male students. This finding is similar to that of past studies that established gender differences affect students' SE and PSS (Wahyudiati et al., 2020; Fadli, 2019). Likewise, studies by Wahyudiati (2021a, 2021b) also confirm that female students have higher collaboration and communication skills (CCS) than male students. Furthermore, the studies establish that SE, CCS, and PSS constitute soft skills that significantly affect students' personalities and academic achievements (Wahyudiati et al., 2019a, 2019b). The tendency of higher SE, CSS, and PSS levels in females than males was because female students have motivation, interest, diligence, and perseverance in doing their assignments and more positive self-confidence than male students (Wahyudiati et al., 2020).

Other findings also reveal differences in SE, CCS, and PSS among students based on gender, but no differences were identified based on grade levels. This means that SE, CCS, and PSS skills among freshmen, sophomores, and junior students do not differ significantly. This situation was because current learning activities are student-centered with monotonous strategies and models every semester; there has been a lack of innovations; the learning process has focused more on enhancing cognitive skills than developing students' soft skills (Sumardi et al., 2020; Ismiani et al., 2017; Villafane & Lewis, 2016). These interesting findings are similar to those of past studies, where SE, CCS, and PSS did not develop in the following semesters (Wahyudiati, 2021a, 2021b).

Other research findings based on the test of between-subjects effects confirm differences in PSS skills based on gender, but no differences in SE and CSS. Based on grade levels, no differences were identified in SE, CSS, and PSS. The research findings were similar to those of Villafane et al. (2014). They validated differences in students' PSS based on gender, where female students have higher PSS skills than male students. Studies by Wahyudiati et al. (2019a, 2019b) and Fadli (2019) also confirmed no differences in students' SE and CSS based on gender and grade levels. The absence of differences in students' SE, CSS, and PSS based on grade levels was caused by learning processes focusing more on achieving cognitive aspects at each grade, so students' SE, CSS, and PSS did not grow, resulting in the low level of soft skills as the 21st-century learning success benchmarks (Ismiani et al., 2017; Villafane & Lewis, 2016). Consequently, learning practices at universities must be designed properly and focus on developing students' soft skills to

support learning achievements that refer to the 21st-century learning targets.

For supporting the above findings, students' SE, CSS, and PSS were specifically analyzed based on grade levels employing the multiple comparisons test. The research findings reveal no differences in the SE, CSS, and PSS skills between freshman, sophomore, and junior grades. The factual condition was affected by applying monotonous learning methods lacking innovations in each semester. As a result, learning is not interesting, and students are less motivated to develop their soft skills, which further results in low academic achievements (Fadli & Irwanto, 2020; Ismiani et al., 2017).

Students' self-efficacy (SE), collaboration and communication skills (CCS), and problem-solving-skills (PSS) have a positive correlation with their academic achievements. This fact is supported by multiple findings that show SE, CCS, and PSS significantly influence academic achievements at the higher education level (Wahyudiati et al., 2020; Fadli & Irwanto, 2020). For this reason, SE, CCS, and PSS aspects are factors that very urgently need to be researched in depth at the primary, secondary, and tertiary levels of education to realize effective learning activities that refer to the 21st-century learning practices. Also, given the differences of SE, CCS, and PSS based on gender, learning practices should consider gender aspects in the planning, implementation, and evaluation so that students achieve learning targets, and learning does not focus merely on cognitive aspects, neglecting students' soft skills. Next, to support 21st-century learning, higher education institutions should help lecturers and educators design and apply learning practices that focus on developing soft skills through active, innovative, and collaborative learning methods. For this reason, multiple corrective efforts are expected to optimize learning processes and outcomes that refer to 21st-century learning outputs at the higher education level.

5. Conclusion

The research comes with the following conclusions: 1) female students have higher levels of SE, CCS, and PSS than male students; 2) there were differences in students' SE, CCS, and PSS based on gender, yet no differences were identified on grade levels; 3) SE, CSS, and PSS differences based on gender and grade levels occur simultaneously; 4) gender factor has significant effects on PSS; and 5) there were no differences in SE, CCS, and PSS scores among freshmen, sophomores, and junior students.

The survey findings were confirmed by the findings from interviews that female students have higher self-confidence (SE), problem-solving skills (PSS), communication skills (CS), cooperation, interest, and motivation than male students and that no differences in SE, CCS, and PSS scores were identified among freshmen, sophomores, and junior students. For this reason, it is recommended that lecturers and higher education institutions prioritize SE, CCS, and PSS development through constructivism-based learning with active and innovative learning models or interactive media to enhance students' academic achievements and develop their soft skills as 21st-century learning success benchmarks.

The findings of this research differ from previous findings: females have higher levels of SE, CCS, and PSS than males; gender-based differences of SE, CCS, and PSS among students existed, but no differences were identified on grade levels; gender factor has significant effects on PSS; there were no SE, CCS, and PSS differences among freshmen, sophomores, and junior students.

This study provides information related to the abilities of students who have significant differences at the tertiary level. This research implies that fundamental changes must be made in planning and implementing learning activities that are not gender-biased. In addition, it is necessary to start programming gender-responsive extra- and intra-curricular activities so that there are no differences in student learning outcomes based on gender.

The research has limitations in terms of the respondents' number and that not all of them were involved in the interviews in the relatively short study period, three months. Therefore, for further research, it is recommended to expand the surveys by increasing the number of respondents and extending the research period to 1 semester. In addition, since this research is a cross-sectional study involving three universities, it is highly requisite to conduct a longitudinal study involving a larger number of samples supported by more complex, comprehensive research variables. For follow-up, it is urgent to study strategies to effectively develop SE, CCS, and PSS at the higher education level. Finally, the findings of this research have high importance in bridging further studies on strategies to enhance students' soft skills, a matter which has been less researched.

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