

Assessment of oral communication skills of chemistry department students in polymer chemistry courses at online learning

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Received 14 October 2022 ▪ Accepted 16 March 2023

Abstract

Online learning should ensure that students' oral communication skills remain good. This study aimed to determine the oral communication skills of chemistry department students in polymer chemistry courses at online learning based on differences in gender and study program. The research design was quantitative descriptive. The data collection tool was an observation sheet about the assessment of oral communication skills collected during presentation activities. The sample was 73 students. Data were analyzed utilizing a one-way analysis of variance test. The findings reveal that students' oral communication skills based on gender have differences, but the difference was not significant. The oral communication skills of male students are higher than female students. There was a significant difference in students' verbal communication skills based on study programs. Chemistry students' oral communication skills have higher than chemistry education students. The implications of the research results are described.

Keywords: assessment, online learning, oral communication skills, polymer chemistry courses

INTRODUCTION

The COVID-19 pandemic has significantly impacted the world of education at all levels, from kindergarten to university. There is no other choice to continue the teaching and learning process other than through distance learning or online learning, even though the readiness of schools and students for it is insufficient (Durante, 2022). Adapting to the COVID-19 pandemic situation takes a long time and becomes the biggest challenge in its management, so the good and bad impacts of online learning are felt simultaneously (Peimani & Kamalipour, 2021). The need for information and communication technology in education in this situation is increasing along with the rapid development of online learning (Davis et al., 2019; Dumford & Miller, 2018; Palvia et al., 2018). The use of technology makes all activities that were previously disconnected can be connected, far become close, and direct activities become virtual activities (Bayuo et al., 2022).

Online learning in higher education does not affect student attendance in class and does not affect their achievement. Many students think that online and face-

to-face learning in the context of delivering material and concepts facilitates students to discuss, debate, and collaborate even though they are in different spaces. However, it is different in the context of direct experiences, such as field activities and laboratory practicums. Students need tools, time, and play in a broad and flexible scope (Alawamleh et al., 2022). Four factors influence student satisfaction in online learning: the time of doing assignments, active learning, collaboration with classmates, and communication between students, lecturers, and lecture administration (Cavanaugh & Song, 2014).

Mobile learning is an interactive tool used in online learning. The efficiency and effectiveness of using mobile learning in education are necessary to overcome obstacles or challenges during online learning. Communication is one of the keys to sustainability in the process. The instructional design of online learning must ensure that students' communication skills remain good (Tanian & James, 2011). Communication activities are not lost but are growing. It is easier for students to connect with other students at different universities, engage in scientific discussion activities, and students can take advantage of various free online platforms to

Contribution to the literature

- This study shows students' oral communication skills during the COVID-19 pandemic.
- This study contributes to the literature regarding whether there are differences in the context of gender and type of study program in students' oral communication skills post-pandemic COVID-19.
- This study will add to the diversity of the methodology because it uses an approach of online observation.

support their knowledge. Students have the opportunity to explore other soft skills that are not obtained directly from lecture activities (Costigan & Brink, 2020).

Communication is a process of exchanging information and thoughts between two or more people to generate knowledge and transmit it to others which will be interpreted in their way (Rahman, 2010). Communication involves actively and consciously carrying out facts, ideas, thoughts, and feelings. Communication is not entirely free or bound; it depends on the purpose and context (Mar & Sall, 1999). In communication, there must be an agreement and a general meaning that everyone can accept (Hacifaferoglu, 2014). Social relations between humans require practical communication skills to understand each other's characteristics, especially for people who work in professional fields that require a lot of interaction and discussion (Aydin, 2015). One can quickly enter new situations by using good knowledge and communication skills.

Oral communication is one of the most frequently applied communications in everyday life, for example, speaking. Among speaking activities are giving opinions as criticism and suggestions, explaining information and knowledge, and giving impressions to others. Oral communication can occur successfully or with failure because it relates to motivation, method, and time (Dunbar et al., 2006). Oral communication does not come directly because it requires understanding what to say, how to say it, how to appear in front of many people, and how to continue speaking in a group environment. All of which require a thought process (Rahman, 2010). Communication is dynamic because it develops from time to time with a series of procedures accompanied by changes that make everyone's knowledge and relationships continue to grow and develop.

In higher education, lecturers and students must engage in effective communication to achieve learning objectives. The communication process, providing information, and discussions between lecturers and students should continuously be carried out using reflective dialogue (van der Vleuten et al., 2019). Students can speak in various contexts in the classroom during learning and outside the school during non-academic activities (Kansizoglu & Akdogdu, 2022). Oral communication skills are very contextually specific and depend on the context to be achieved, for example, about personal life as a student, interaction with the social environment, desires, and aspirations to political

information (Rahman, 2010). Oral communication skills can improve if directed and demanded so that students can overcome their problems and adapt to direct and virtual situations (Sanad, 2021; Sterling et al., 2016).

An assessment measuring instrument is needed to align with the learning outcomes in assessing students' communication skills. Assessment is essential to the learning process because students know what they will learn and must do to be evaluated (Dawson, 2016). Learning assessment generally focuses on standard conditions, namely exams and surveys. However, it is different in online learning; each evaluation must be designed considering the pedagogical elements of online learning (Akimov & Malin, 2020). Measuring skills in online learning requires appropriate assessment tools, and learning activities must be clear and proper to have observable evidence (Xiong & Suen, 2018).

Oral communication skills make the process; as a result, one of which is behavior. The assessment method that is more often used is a direct observation which has several formats according to the aspect being assessed. Several assessors can evaluate communication skills called observers during the learning process. Observers include students, peers, class teachers, and supervisors (van der Vleuten et al., 2019). An assessment approach in direct observation is needed, called an assessment rubric. In each assessment, the observer must already know and understand the rubric in assessing each action to make conclusions and estimates. There is an analytical scoring system; each individual is holistically evaluated based on the whole of what they do (Dunbar et al., 2006).

Oral communication skills are based on fluent, correct, and precise communication in everyday language (Sanad, 2021). Good oral communication skills are among the most desirable skills for college students who are very important to compete in the world of work as educated people (Williams, 2005). Every profession must develop communication skills in leadership, working in groups, critical thinking, management, and data analysis to prepare for a professional career (Hacifaferoglu, 2014; Blickley et al., 2013). In hiring employees, the requirements for good speaking and communication skills are not infrequently necessary assessments (Sanad, 2021). However, in (Anewalt & Polack, 2017) the oral communication skills of new college graduates are not able to meet the demands of the industry, so it is necessary to develop broad and disciplined oral communication skills in direct learning practice.

Table 1. Rubric of questionnaire

Range	Level
$x \leq 2.00$	Very low
$2.00 < x \leq 3.00$	Low
$3.00 < x \leq 4.00$	Moderate
$4.00 < x \leq 4.50$	High
$4.50 < x \leq 5.00$	Very high

One of the departments that prepare students to enter the industrial world is the chemistry department student (Coppola & Daniels, 1996). Chemistry students with laboratory experience, research skills, and skills in using tools and materials will be faced with the world of work, which consists of various layers ranging from public, employees, educators, researchers, and so on with different fields of knowledge (Wilkes, 2012). The communication established must be understood and understood by the various groups (Durante, 2022). The abilities possessed as a graduate of the chemistry department can be optimal if delivered with scientific communication and correct interpretation and not just using clear and compelling language (McLaren, 2019). All courses studied should be directed to learning that emphasizes student communication skills. One such course is polymer chemistry.

Polymer chemistry is a course that aims to introduce students to the world of the chemical industry, such as cosmetics, petroleum, food, pharmaceuticals, clothing, construction, packaging, electronics, and automotive. So that it becomes a compulsory course for chemistry students and is an elective course for chemistry education students (Karayilan et al., 2021a). The polymer chemistry course studies the basic principles of polymers, classification, properties, synthesis, characterization, polymer processing experiments, polymer applications, polymer systems, macromolecules, and colloids (Al-Moameri et al., 2018). However, in some universities, polymer chemistry is discussed in materials chemistry courses or organic chemistry as a subtopic (Clapson et al., 2020).

Teaching polymer chemistry from the beginning in the undergraduate chemistry program curriculum leads students to understand the application of polymer chemistry in research, academia, industry, and other disciplines (Karayilan et al., 2021b). Polymer chemistry, which is very close to everyday life, can increase student interest in learning (Gilbert et al., 2020).

Focus on student communication skills during a pandemic in online learning is urgently needed. For this reason, direct observations are made in the form of online learning observations to determine to what extent the oral communication skills of chemistry department students in polymer chemistry courses in online learning are developing. Online learning that is carried out can certainly affect students' oral communication skills. The research questions in this study are:

1. How are the oral communication skills of chemistry students in polymer chemistry courses at online learning?
2. What are the differences in the oral communication skills of chemistry students in polymer chemistry courses at online learning based on gender?
3. What are the differences in the oral communication skills of chemistry students in polymer chemistry courses at online learning based on the study program?

METHODS

Research Design and Sample

The research method used in this study was quantitative descriptive research. Quantitative descriptive research aimed to explain existing phenomena using numbers to describe individual or group characteristics (Sidel et al., 2018). The sample in this study using a random sampling technique was 73 chemistry department students at Universitas Negeri Yogyakarta [Yogyakarta State University] class of 2020 semester four with details, namely 34 chemistry students in class B, 24 chemistry students in class E, and 15 chemistry education students in class A.

The research was conducted from May until June 2022 through the Zoom application. Students were divided into groups, each consisting of four-six students. Research on chemistry students of class B as many as three meetings consisting of six groups, class E conducted two meetings of four groups, and students of chemistry education class A as many as two meetings of four groups. Each meeting lasted 100 minutes.

Instrument and Data Collection

The research instrument used was an oral communication skill instrument developed by (Sonseca et al., 2015), which was adapted to the needs of the research data (**Appendix A**). The adjustment was found in the purpose of the instrument, which was to measure college students' communication skills; this was by the sample in this study, namely college students.

Furthermore, the timing and use of the instruments developed were similar to this study, namely during oral presentations of 10-15 minutes in groups that two observers assessed. The oral communication skills instrument has 11 items with the following dimensions: organization, structure, content, effectiveness, and evaluation. Each item has a rating scale of one-five with explicit provisions. The assessment was estimated using a Likert scale. **Table 1** shows the rubric of a questionnaire. **Appendix B** shows rubric for assessing oral communication skills.

Table 2. Validity instrument of oral communication skills

Item	Validity score	Description
Effective introduction	0.279	Valid
Main objectives and ideas	0.366	Valid
The student presents and properly argues the results	0.750	Valid
Conclusions are appropriate and concise	0.493	Valid
Discuss and justifies the information presented	0.787	Valid
Structured, clear, effective and consistent	0.772	Valid
Appropriate technical language	0.651	Valid
Available resources for a more efficient communication	0.762	Valid
Adjust to time available	0.411	Valid
Clear voice, the right tone, proper corporal posture and eye contact with the audience	0.606	Valid
Analyze, evaluate and answer the audience questions	0.491	Valid

Table 3. Kolmogorov-Smirnov normality test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
OCS	.100	73	.065	.976	73	.175

Note. ^aLilliefors significance correction

Validity and Reliability

Before the students' oral communication skills observation sheet was used in research activities, the validity and reliability tests were conducted using SPSS statistics 2. The instrument of oral communication skills has been tested for validity and reliability. R table on $df=n-2$ with a probability of 0.05 is 0.2303. If $R \text{ count} > R$ table, then the item was valid.

Table 2 shows the test scores for the validity of the oral communication skills instrument. The reliability value using Cronbach's alpha method is 0.777, more significant than the R table, so the reliability of each item of the oral communication skills instrument was met.

Data Analysis

Data analysis was performed using Microsoft Excel and SPSS 25. Descriptive statistics, including the number, average, and standard deviation, will describe the data obtained about the oral communication skills of chemistry department students.

Table 3 shows the data obtained is normal based on the Kolmogorov-Smirnov normality test with a

significance of $0.065 > 0.05$. Then an analysis of variance (ANOVA) test was carried out, considering the assumptions of data type, sample type, normality, and homogeneity. All were declared valid to use to see whether gender and study program had significant differences in students' oral communication abilities.

FINDINGS

Students' Oral Communication Skills in Polymer Chemistry Courses at Online Learning

Table 4 shows the overall average of chemistry department students' oral communication skill items in polymer chemistry courses at online learning. In **Table 4** of results of oral communication skills above, the oral communication skills of chemistry department students in polymer chemistry courses at online learning were overall at a low level with an average of 2.87 and a standard deviation of 0.50. The highest average items were "discuss and justifies the information presented" (item 5) and "clear voice, the right tone, proper corporal posture and eye contact with the audience" (item 8), with both items having a score of 3.38 (moderate). While the lowest item was "analyze, evaluate and answer the audience questions" (item 11), with a score of 1.91 (very low).

Table 5 shows descriptive statistical results of students' oral communication skills based on the gender*study program.

Table 4. Students' oral communication skill

Item	OCSM	Description
Effective introduction	3.30	Moderate
Main objectives and ideas	2.75	Low
The student presents and properly argues the results	3.02	Moderate
Conclusions are appropriate and concise	2.20	Low
Discuss and justifies the information presented	3.38	Moderate
Structured, clear, effective and consistent	3.04	Moderate
Appropriate technical language	3.34	Moderate
Available resources for a more efficient communication	2.47	Low
Adjust to time available	2.83	Low
Clear voice, the right tone, proper corporal posture and eye contact with the audience	3.38	Moderate
Analyze, evaluate and answer the audience questions	1.91	Very low

Note. Overall: 2.87 (low); SD: 0.50; & OCSM: Oral communication skills mean

Table 5. Descriptive statistics of comparison between student’s oral communication skills based on gender*study program

Gender	Study program	Mean	SD	n
Male	Chemistry	3.0558	0.43561	12
	Chemistry education	2.4840	0.55030	5
	Total	2.8876	0.52754	17
Female	Chemistry	2.9435	0.54911	46
	Chemistry education	2.5330	0.62233	10
	Total	2.8702	0.57900	56
Total	Chemistry	2.9667	0.52609	58
	Chemistry education	2.5167	0.57971	15
	Total	2.8742	0.56390	73

Note. SD: Standard deviation & Dependent variable: Oral communication skills

Table 5 shows that the highest average of oral communication skills was from male students with a chemistry study program of 3.05 (moderate), while the lowest average of oral communication skills was from male students with chemical education study program of 2.48 (low).

Table 6 shows the results of the one-way ANOVA test of oral communication skills based on the gender*study program. From **Table 6**, in the corrected model, it can be seen that there is an effect of all variables (gender, study program, and gender interaction*study program) together on the dependent variable (oral communication skills) with a significance of $0.042 < 0.05$ which means the model is valid. In the gender*study program, it can be seen that the influence of the gender*study program on the value of oral communication skills in the model with a significance of $0.642 > 0.05$, which means that the gender*study program has no significant effect.

Communication Skills of Chemistry Department Student at Online Learning Based on Gender

Table 7 shows the communication skills of students by gender. There were 17 male students and 56 female students. The highest oral communication skill item for male students was “discuss and justifies the information

Table 7. Student’s oral communication based on gender

Item	MM	Description	FM	Description
Effective introduction	3.29	Moderate	3.30	Moderate
Main objectives and ideas	2.70	Low	2.76	Low
The student presents and properly argues the results	3.05	Moderate	3.01	Moderate
Conclusions are appropriate and concise	2.11	Low	2.23	Low
Discuss and justifies the information presented	3.52	Moderate	3.33	Moderate
Structured, clear, effective and consistent	3.23	Moderate	2.98	Low
Appropriate technical language	3.41	Moderate	3.32	Moderate
Available resources for a more efficient communication	2.58	Low	2.44	Low
Adjust to time available	2.76	Low	2.85	Low
Clear voice, the right tone, proper corporal posture and eye contact with the audience	3.41	Moderate	3.37	Moderate
Analyze, evaluate and answer the audience questions	1.70	Very Low	1.98	Very Low

Note. MM: Male mean; FM: Female mean; Male: Overall: 2.89 (low) & SD: 0.58; & Female: Overall: 2.87 (low) & SD: 0.47

Table 6. Student’s oral communication skills by using one-way ANOVA test based on gender*study program

Source	TIII SS	df	MS	F	Sig.
Corrected model	2.542 ^a	3	0.847	2.873	0.042
Gender*study program	0.064	1	0.064	0.218	0.642

Note. TIII SS: Type III sum of squares; MS: Mean square; & Dependent variable: Oral communication skills

Table 8. ANOVA test based on gender

	TII SS	df	MS	F	Sig.
Between groups	0.004	1	0.004	0.013	0.909
Within groups	22.889	71	0.322		
Total	22.893	72			

Note. TIII SS: Type III sum of squares; MS: Mean square; & Dependent variable: Oral communication skills

presented” (item 5), with a score of 3.52 (moderate). The lowest oral communication skill item for male students was “analyze, evaluate and answer the audience questions” (item 11), with a score of 1.70 (very low). Meanwhile, female students’ highest oral communication skill item was “clear voice, the right tone, proper corporal posture and eye contact with the audience” (item 10), with a score of 3.37. The lowest oral communication skill item for female students was equal to that of male students. It was “analyze, evaluate and answer the audience questions” (item 11), with a score of 1.98 (very low). The average result of male students’ oral communication skills was higher than the average for female students’ communication skills.

Table 8 shows the differences of students’ oral communication skills based on gender in online learning. From the ANOVA **Table 8**, in the significant column, the results were $0.909 > 0.05$, so there was no significant difference in the average score of male students’ oral communication skills with female students.

Oral Communication Skills of Chemistry Department Student at Online Learning Based on Study Program

Table 9 shows the communication skills of students by study program. There were 58 chemistry students

Table 9. Student's oral communication based on study program

Item	CM	Description	CEM	Description
Effective introduction	3.43	Moderate	2.80	Low
Main objectives and ideas	2.79	Low	2.60	Low
The student presents and properly argues the results	3.08	Moderate	2.80	Low
Conclusions are appropriate and concise	2.37	Low	1.53	Very Low
Discuss and justifies the information presented	3.50	Moderate	2.93	Low
Structured, clear, effective and consistent	3.12	Moderate	2.73	Low
Appropriate technical language	3.44	Moderate	2.93	Low
Available resources for a more efficient communication	2.63	Low	1.86	Very Low
Adjust to time available	2.98	Low	2.26	Low
Clear voice, the right tone, proper corporal posture and eye contact with the audience	3.43	Moderate	3.20	Moderate
Analyze, evaluate and answer the audience questions	3.43	Moderate	2.80	Low

Note. CM: Chemistry mean; CEM: Chemistry education mean; Chemistry : Overall: 2.97 (low) & SD: 0.51; & Chemistry education : Overall: 2.52 (low) & SD: 0.51

Table 10. ANOVA test based on study program

	TIII SS	df	MS	F	Sig.
Between groups	2.420	1	2.420	8.390	0.005
Within groups	20.474	71	0.288		
Total	22.893	72			

Note. TIII SS: Type III sum of squares; MS: Mean square; & Dependent variable: Oral communication skills

and 15 chemistry education students. The highest oral communication skill item for chemistry students was "discuss and justifies the information presented" (item 5), with a score of 3.50 (moderate). The lowest oral communication skill item for chemistry students was "analyze, evaluate and answer the audience questions" (item 11), with a score of 1.87 (very low). Meanwhile, chemistry education students' highest oral communication skill item was "clear voice, the right tone, proper corporal posture and eye contact with the audience" (item 10), with a score of 3.20 (moderate). The lowest oral communication skill item for chemistry education students was "conclusions are appropriate and concise" (item 4), with a score of 1.53 (very low). The average result of chemistry students' oral communication skills was higher than that of chemistry education students.

Table 10 shows students' oral communication skills based on study program differences in online learning. From the ANOVA **Table 10**, in the significant column, the results were $0.005 < 0.05$, so there was a significant difference in the average score of chemistry students' oral communication skills with chemistry education students.

DISCUSSION

Environment and personality are the factors that most influence the communication process (Barinova et al., 2018; Martyna, 2016). The environment, where you live and work requires adaptation, making communication the main factor (Aydin, 2015). Personality in each individual is a major influence that causes a person's way and style of communication to be

different and varied (Cox, 2019; Taylor et al., 2013). The oral communication style has four elements: comfort when interacting, as it is without being made up, feeling connected to the other person, and being professional (Coffelt et al., 2019).

In communication activities, someone often discusses something with the same language, words, and sentences as someone else, but in the end, they will convey different meanings (Abura, 1998). The words, sentences, and method is chosen to share information affect the meaning received by the listeners because everyone has different understandings, abilities, thinking styles, and cultural backgrounds. In the communication process, it is not uncommon for misconceptions, self-confidence, misinterpretations of words, daydreaming, noise, and physical discomfort. Another factor in the effectiveness of communication is the mastery of the material, attitude, health, age, time, and socio-economic conditions of a person (Osakwe, 2009).

When speaking in public, such as in presentations, students must pay attention to five concepts: social construction, relationships, strategies, symbols, and adaptability. Social structure: there is coordination between a group of people towards meaningful knowledge through language as a basic system. Relation: is the existence of interactions and collaborations that have meaning in opinion. Strategy: the ability to adapt to situations and conditions. Symbol: there is a transfer of meaning from the expressions one has when constructing knowledge. Adaptability: there is information and knowledge that changes and differs from what was previously understood (Broeckelman-Post & Ruiz-Mesa, 2018).

Communication Skills of Chemistry Department Student at Online Learning Based on Gender

The highest oral communication skill item for male students is item 5, "discuss and justifies the information presented." In learning, male students lead group discussion activities before presenting their work and

confirming the information and sources used. During discussions, male students were better able to involve other group members to give, listen, ask for opinions and respond to others. In communication, the use of language and social interaction is necessary to achieve a goal (Mar & Sall, 1999).

The highest oral communication skill item for female students is item 10, "clear voice, the right tone, proper corporal posture and eye contact with the audience." This item is an essential element that affects communication and requires skills. A clear voice, the right choice of tone, the appropriate style of conveying, and the presence of eye contact with other people will make the message we give readily accepted and understood by others (Rahman, 2010). Although this is the item with the highest score of oral communication skills possessed by female students, the average item score compared to male students is lower. So that male students are better in technical terms during communication activities.

The lowest oral communication skill item for male and female students is the same: item 11, "analyze, evaluate and answer the audience questions." Female students had higher averages on this item than male students. In answering questions, female students pay more attention to what will be answered by analyzing and evaluating the knowledge they have understood, even with the teacher's help. One of the essential things in communication skills is the ability to say yes or no to a statement and give reasons (Mar & Sall, 1999).

The average result of male students' oral communication skills is higher than the average for female students' communication skills. However, the difference is not much different, only slightly. This result is different from the research conducted by (Mohtasham & Farnia, 2017) that women's oral communication skills have a higher value according to the need for more vocabulary in daily activities. A study by Loureiro et al. (2020) also found that women's oral communication skills are much higher than men's because women tend to be better able to express themselves and process words in speaking.

The results of this study align with research conducted by Hacicaferoglu (2014) that there is no significant difference based on gender. Men and women have oral communication skills that are not much different and tend to be the same. It can be seen from the details of the average of each item of oral communication skills between male and female students.

However, the results of this study contradict the results of research conducted by Bolívar-Cruz and Verano-Tacoronte (2018) that gender differences are one of the essential factors in oral communication skills, especially in presentation activities related to self-confidence. Similar to the research conducted by Marcella and Binfield (1996), there are significant gender

differences in oral communication because it is based on different ways of communicating between men and women. And based on research conducted by Loureiro et al. (2020), there are gender differences in favor of one gender, especially in formal conditions.

Oral Communication Skills of Chemistry Department Student at Online Learning Based on Study Program

The highest oral communication skill item for chemistry students is item 5, "discuss and justifies the information presented." Chemistry students can discuss polymer chemistry in a deep and broad scope independently, in contrast to chemistry education students who are only general. Oral communication is not only in the form of delivering learning outcomes in the form of presentations but also in how discussions occur in groups and the depth of understanding of the material (Rahman, 2010). In pure scientific disciplines such as chemistry, oral communication skills are needed so that students can discuss results and convey information close to everyday life in the industrial world (McLaren, 2019).

The lowest oral communication skill item for chemistry students is item 11, "analyze, evaluate and answer the audience questions." Chemistry students, in answering questions from other students, still have not done in-depth analysis and tend to be directed by lecturers. In this case, chemistry education students have higher average grades. Chemistry education students, in answering questions, conduct research and, as much as possible, provide their explanations before being directed by the lecturer. The existence of feedback in communication is always expected; it illustrates whether the information provided has been understood by the recipient effectively or not (Osakwe, 2009). Lecturers in this activity become an essential element to validate that the information, ideas, and data submitted are by the material and learning objectives (Khasawneh, 2021).

The highest oral communication skill item for chemistry education students is item 10 "clear voice, the right tone, proper corporal posture and eye contact with the audience." In presentation activities, the speaker must emphasize vocabulary and sentences that require special attention from the listener; the grammar must be coherent so that it is easy to understand, and the pronunciation is fluent and accurate (Sanad, 2021). Chemistry education students are very concerned about their appearance in making presentations because chemistry education students have been directed to become teachers who can make students in class focus on them. This research conducted by (Mar & Sall, 1999) found that proper appearance, speech, and suitable delivery methods are essential to communication so listeners can understand the message well.

The lowest oral communication skill item for chemistry education students is item 4, "conclusions are

appropriate and concise." Chemistry education students cannot convey conclusions from the results they found in concise and precise language. They tend to express the findings in the figurative language before getting to the essential points of the learning objectives. This is because chemistry education students are accustomed to systematically explaining things, so before conveying conclusions, they need an introduction to learning (Stewart & Lagowski, 2003).

The average result of chemistry students' oral communication skills is higher than that of chemistry education students. The results are because polymer chemistry courses are compulsory subjects for chemistry students, so they become more enthusiastic about participating in learning activities, affecting their oral communication skills. This is also because the content knowledge of chemistry students about polymer chemistry is more in-depth than chemistry education students, so when measuring oral communication skills, the results are not higher than chemistry students. This follows research conducted by Ashraf et al. (2011) and Jones and Seybold (2016) that oral communication skills are very dependent on the extent to which the depth of knowledge can be put into a single structured explanation, clear and easy to understand.

CONCLUSION

Overall, the oral communication skills of chemistry department student in the polymer chemistry course at online learning were measured using the observation method with 11 items of oral communication skill instruments at a low level. There is no significant difference in students' oral communication skills based on gender. The oral communication skills of male students are higher than female students, and the difference is not much different, only slightly. Based on the study program, there is a significant difference in students' oral communication skills. Chemistry students' oral communication skills have a higher average than chemistry education students. This contributes to the literature that the oral communication skills of chemistry students do not significantly affect gender because internal and external factors greatly influence the individual. However, the oral communication skills of chemistry students significantly affect the study program. Because study programs with learning objectives focused on scientific content abilities will make students more prepared and able to process language and associate the right words, giving them better communication skills.

The research, which was only conducted for one month and was not carried out for one semester of polymer chemistry learning, became a limitation in this study. Further research can be carried out in one semester by measuring students' oral communication skills in online learning in different courses and

comparisons with other subjects. Based on the research results, the government, society, and the world of work should no longer assume that students' oral communication skills are based on gender. Lecturers and universities focus on developing students' soft skills that can train their communication skills regardless of gender differences. Furthermore, for the industrial world, choosing students with good communication skills and high scientific knowledge is recommended. The government, universities, lecturers, students, and the community can continue encouraging online learning so that students' oral communication skills are no longer low and can improve so that students are ready and maximal to enter the world of work.

Author contributions: AA: obtaining data for analysis, analysis of obtained data, & article writing & ER & JJ: developing research design & reviewing of publications of the article's theme. All authors have agreed with the results and conclusions.

Funding: This study was supported by the Indonesian Ministry of Education and Culture for funding this research through the Program Magister Menuju Doktor Untuk Sarjana Unggul (PMDSU) [Masters Towards Doctoral Program for Superior Scholars (MTDPSS)] scheme.

Ethical statement: Authors stated that the study did not require any ethics committee approval. The research was carried out when the lecture was taking place.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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APPENDIX A

Table A1. Oral communication skill instrument

Items	Description
1	Effective introduction
2	Main objectives and ideas
3	The student presents and properly argues the results
4	Conclusions are appropriate and concise
5	Discuss and justifies the information presented
6	Structured, clear, effective and consistent
7	Appropriate technical language
8	Available resources for a more efficient communication
9	Adjust to time available
10	Clear voice, the right tone, proper corporal posture and eye contact with the audience
11	Analyze, evaluate and answer the audience questions

APPENDIX B

Table B1. Rubric for assessing oral communication skills

Items	1-Deficient	2-Regular	3-Good	4-Very good	5-Excellent
1	Introduced but mostly incomplete	Introduced but undeveloped and incomplete	Introduced to the audience	Clearly introduced and audience put in situation	Clearly introduced and audience put in situation plus interesting examples
2	Very few objectives	Most of the objectives still undeveloped and incomplete	All the objectives	All the objectives organized and concise	All the objectives organized and concise with student own perspective
3	Very few results	Most of the results still undeveloped and incomplete	All results	Main results were presented and explained	Main results and well discussed
4	Very few conclusions	Most of the conclusions still undeveloped and incomplete	All conclusions	Main conclusions organized and concise	Main conclusions organized and concise and the student evaluates them
5	Done with lots of mistakes	Done with some mistakes	Well done but incomplete	Well done	Well done emphasizing the relevant aspects
6	Partly structured	Structured	At least structured and clear	Structured, clear and consistent	Structured, clear, consistent and effective
7	With lots of mistakes	With some mistakes	Occasionally and correctly	Frequently and correctly	Frequently, correctly and introduce new concepts
8	Used but when not really necessary	Used to clarify ideas	Clarify some main ideas	Frequently clarify main ideas	Frequently clarify main ideas and use new resources
9	Time was too long or too short	Approximately time available	Adjusts into time available	Adjusts into time available and spends proper time in each part	Adjusts into time available and spends proper time in each part and redistribute time if needed
10	At least makes one correctly	Voice clear but tone boring	Voice clear and right corporal posture	Voice clear, right tone and corporal posture	Voice clear, right tone and corporal posture and eye contact with audience
11	Analyze but not to evaluate or answer questions	Analyze and evaluate but not to answer questions	Analyze and evaluate but not to answer questions with the help of the teacher	Analyze and evaluate answering questions with own perspective	Analyze and evaluate answering questions Proposing questions and creating debate

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