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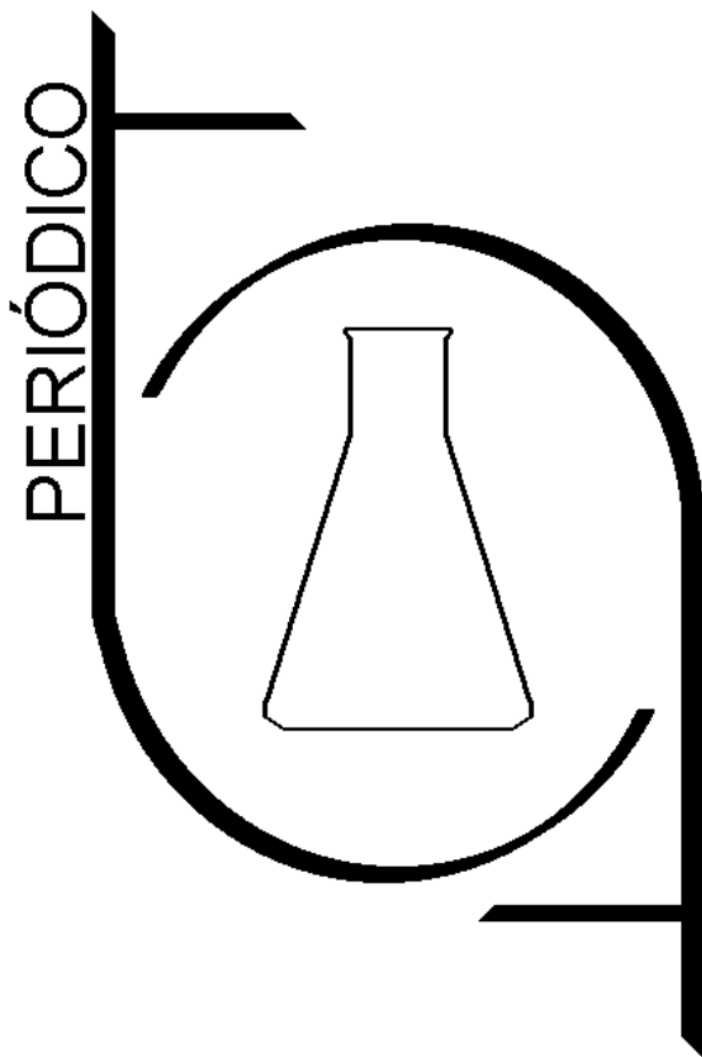
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**Publication Ethics**

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UM VISCÔMETRO ROTACIONAL**

*THE STUDY OF THE DEPENDENCE OF THE RHEOLOGICAL  
PROPERTIES OF GEL-FORMING COMPOSITIONS ON THE  
CRACK OPENING WHEN MODELING THEIR FLOW ON A  
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### INTELIGÊNCIA INTERPESSOAL DE ESTUDANTES DA ESCOLA PROFISSIONAL EM APRENDIZAGEM QUÍMICA: UM ESTUDO DE CASO

### INTERPERSONAL INTELLIGENCE OF VOCATIONAL HIGH SCHOOL STUDENTS ON CHEMISTRY LEARNING: A CASE STUDY

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## RESUMO

A inteligência interpessoal é a inteligência social que mostra a capacidade de criar bons relacionamentos com amigos ou com o meio ambiente. De fato, essa inteligência não foi treinada ao máximo na aprendizagem na escola, especialmente na química, embora a inteligência seja importante o suficiente para aprimorar a capacidade da criança de socializar com seu ambiente. O objetivo deste estudo foi identificar as reais condições da inteligência interpessoal dos estudantes na Escola Profissional de Farmácia da cidade de Semarang. Uma pesquisa foi realizada no ano acadêmico 2018/2019 com uma amostra de 57 alunos da Escola Profissional de Farmácia Classe XII da cidade de Semarang, na Indonésia, que haviam aprovado como participantes. A amostragem foi realizada aleatoriamente. As técnicas de coleta de dados foram realizadas por observação, avaliação por pares e autoavaliação ao aplicar o aprendizado de química. Os resultados mostraram que 56% dos estudantes possuíam baixa inteligência interpessoal com base nas observações feitas e, de acordo com os resultados da análise da pesquisa com instrumentos de avaliação por pares, havia 59% dos estudantes também categorizados como baixos para essa capacidade. Os resultados da pesquisa com instrumentos de autoavaliação também mostraram que 56% dos estudantes possuíam baixa inteligência interpessoal. A baixa inteligência está principalmente nos indicadores da capacidade de fazer, responder perguntas e fornecer respostas. Esse fato é relativamente semelhante à literatura que revela que 50% dos estudantes têm inteligência interpessoal com uma categoria média-baixa. Portanto, a conclusão é que, na realidade, essa inteligência ainda é baixa.

**Palavras-chave:** *Inteligência interpessoal, inteligência social, aprendizado de química.*

## ABSTRACT

Interpersonal intelligence is social intelligence that shows one's ability to create good relationships with friends or the environment. In fact, this intelligence has not been maximally trained in learning at school, especially in chemistry learning, even though the intelligence is important enough to hone the child's ability to be able to socialize with their environment. The purpose of this study was to identify the real conditions of students' interpersonal intelligence in Pharmacy Vocational High School in the city of Semarang. A survey was performed in the academic year 2018/2019 with a sample of 57 students of class XII Pharmacy Vocational High School in the city of Semarang, Indonesia, who had given their approval as participants. Sampling was done randomly. Data collection techniques were carried out by observation, peer assessment, and self-assessment when applying chemistry learning. The results showed that 56% of students had low interpersonal intelligence based on observations and, according to the results of survey analysis with peer assessment instruments, there were 59% of students also categorized low for this capability. The survey results with self-assessment instruments also showed 56% of students had low interpersonal intelligence. Low intelligence is mainly in the indicators of the ability to ask, answer questions, and provide answers. This fact is relatively similar to the literature, which reveals that 50% of students have interpersonal intelligence with a medium-low category. So the conclusion is that in reality, this intelligence is still low.

**Keywords:** *Interpersonal intelligence, social intelligence, chemistry learning.*

## 1. INTRODUCTION:

Interpersonal intelligence is an intelligence that is important and useful for education and learning in the 21st century. Interpersonal intelligence is a person's ability to interact with others. This intelligence is suitable to be applied in learning as one of the skills that can help students to socialize. Learning that integrates intelligence is unique because it pays attention to the potential and characteristics of each student (Utami, 2019).

Considering the beneficial effects obtained by students by having interpersonal intelligence both now and in the future, it is deemed to be essential to identify students' interpersonal intelligence (Astuti *et al.*, 2019).

Learning about interpersonal intelligence has been applied to curricula in many countries around the world (Utami, 2019). Interpersonal intelligence is social intelligence (Handayani, 2019; Mahmud *et al.*, 2018) that is someone's skill in creating a good relationship with their environment (Suthatorn & Charoensukmongkol, 2018; Safitri & Sriyanto, 2019).

Interpersonal intelligence is intelligence that is shown by the child's ability to socialize with other people well, such as being easy to *get along* with, understanding other people, and cooperating with others (Utami, 2019; Agustika *et al.*, 2019). The components of interpersonal intelligence, in general, are the purpose of learning affective aspects in education (Lorenzo *et al.*, 2019) in school, including chemistry learning.

Components of interpersonal intelligence include organizing groups, negotiating problem-solving, establishing personal relationships, and conducting social analysis (Shearer, 2019). Characteristics and indicators of interpersonal intelligence that are implemented during the learning process, namely: students pay attention to the teacher's explanation attentively, students determine problem-solving by the problem, students take the initiative to express opinions, students become members of an orderly group, students help their friends difficulty in doing the task, students respond to solving the proposed problem and its reasons (Pertiwi, 2018; Sari, 2019).

Each individual owns interpersonal intelligence. This intelligence is vital to be developed in everyday life because every human being lives together in groups and needs others (Kusumaningrum, 2019). Interpersonal intelligence is also an influential element in education in schools because students will interact

or interact with other friends (Hsu & Beasley, 2019). Interpersonal intelligence is shown by the ability of students to socialize (Rusmayadi, 2019). With interpersonal intelligence, a person must be able to establish good relations with the surrounding environment so that it can be said that interpersonal intelligence is the key to dealing with other people (Wulansuci, 2019).

The beneficial effect on the achievement of children's interpersonal intelligence is the success of interacting with others (Suryana, 2019), understand other people well (Yerizon, 2018), can handle problems, understand and recognize prejudices, like group work, give feedback, and empathize, easy to *get along* with others and love to make friends (Astuti *et al.*, 2019). Not only that, students can get excellent academic achievements in the future because students already know the potential they have (Nurtika, 2019) even to college and at work (Wulansuci, 2019).

If interpersonal intelligence is not well developed, children tend to be less sensitive, less caring, selfish, and often offend others. Children who fail to develop interpersonal experiences many obstacles in the social world such as behavior difficulties at school, delinquency, ignorance, peer rejection, emotional challenges, bullying, difficulties in friends, aggressiveness, problems in interpersonal relationships, poor self-concept, failure academic, concentration difficulties, isolation from peers, and depression (Prakoso, 2019).

Interpersonal intelligence is essential for students both at this time and when they have graduated later, especially for Vocational High School (SMK) students. Vocational level students are individuals who are in adolescence. One of the roles of adolescent developmental tasks plays a role in social life, such as developing interpersonal intelligence, both individuals and groups, and mastering the ability to carry out social purposes. With interpersonal intelligence, vocational students can easily interact with friends at school and in the future when continuing their careers, especially for students of SMK Pharmacy. Interpersonal intelligence possessed by SMK Pharmacy graduates will describe a positive or good self-image, then the individual will feel safe and respect oneself and will undoubtedly be able to respect others, the image of the others, the physical environment, the environment social, condition or condition of a person when communicating and body language (Kemala & Sukmawati, 2019).

Based on research conducted by Sari (2019), (Johar *et al.*, 2019) (Syasmita *et al.*, 2019) shows that the interpersonal intelligence of students is still in the low category. Research (Johar *et al.*, 2019) revealed that more than 50% of students with a major in health have interpersonal intelligence with a medium-low category.

Given the importance of interpersonal intelligence for vocational students, therefore it is necessary to know how the interpersonal intelligence profile of students. The purpose of the research to be achieved is to determine the ability to socialize with other people that students have had so far in the field of education, which later on, if found to be still low, can be improved in further learning.

## 2. MATERIALS AND METHODS:

A survey was carried out in the academic year 2019 with a sample of class XII Vocational Pharmacology in the city of Semarang, Central of Java, Indonesia. Sampling was done randomly. Samples obtained as many as 57 students (after agreeing to participate in this survey) of whom 9% male and 91% female; 22% of students have parents as farmers, 35% as civil servants, and 43% as entrepreneurs. Data collection techniques were carried out by observation, peer assessment, and self-assessment. Each of these refers to Shearer (2019), which is adapted to the learning activities carried out in research schools, namely cooperation, responsibility, listening to others, asking questions, answering questions, and providing assistance in answering questions during the discussion.

Data collection instruments (Appendix 4) with all of these indicators were given a score based on the rating scale (score 1-4) so that the maximum score is 24. The scores obtained on the observation sheet are totaled then divided by the total score and determine the students' interpersonal intelligence criteria at class intervals in table 1.

**Table 1.** Criteria for interpersonal intelligence

Interval skor	Criteria
18 > score ≥ 24	Very high
12 > score ≥ 18	High
6 > score ≥ 12	Low
0 > score ≥ 6	Very low

The same data analysis was performed on

the data obtained on the self-assessment and peer-assessment sheets.

Besides, the data obtained were analyzed per indicator, each indicator on the three instruments added up and divided by the total score, then made in the form of a percentage (%) and determine the criteria at certain class intervals (Sugiyono, 2017).

**Table 2.** Criteria for Student Interpersonal Intelligence Assessment

Indicator score (%)	Criteria
75 ≤ score < 100	Very high
50 ≤ score < 75	High
25 ≤ score < 50	Low
0 ≤ score < 25	Very low

## 3. RESULTS AND DISCUSSION:

The results showed that 25% of students live in suburban areas, and 75% of students live in downtown areas. Also, the students studied have identified that 43% of students have low achievement, 40% of students have moderate performance, and 17% of students have high achievement. The results of the interpersonal intelligence of students in this study, there are six aspects of assessment that are tailored to the implementation of learning to uncover students' interpersonal knowledge. The six points are working together, taking responsibility, listening to others, asking questions, answering questions, and providing assistance in answering questions during the discussion. The results of observations of the interpersonal intelligence of students are shown in Table 3.

**Table 3.** Recapitulation of observations of students' interpersonal intelligence

Criteria	Number of learners (children)	Percentage of learners (%)
Very high	5	9
High	19	33
Low	32	56
Very low	1	2

Based on data from Table 3, it can be seen that as many as 56% of students have interpersonal intelligence with a low category. Thus it can be said that the majority of students

have low interpersonal intelligence. The same result was found by Purwanto (2019) that as many as more than 50% of students have interpersonal intelligence with low categories. This is indicated because students have not dared to create active conversations in the classroom, are less involved in delivering arguments, even slow to absorb information. Learners are more silent during the learning process, waiting to be appointed by the teacher to express their opinions in class and ashamed (Syarifatunnisa, 2019).

The low data of students' interpersonal intelligence is also found in peer assessments that have been distributed to students. The results of students' interpersonal intelligence on the peer assessment instrument are shown in table 4.

**Table 4.** Recapitulation of students' interpersonal intelligence by peer assessment

Criteria	Number of learners (children)	Percentage of learners (%)
Very high	5	9
High	17	31
Low	34	59
Very low	1	2

In table 4, it can be seen that as many as 59% of students have a low level of interpersonal intelligence. The low interpersonal intelligence was also revealed by Saputra, *et al.* (2018) and Wulandari, *et al.* (2018), there is a close relationship between students' low interpersonal intelligence and learning outcomes. Students with low interpersonal intelligence, low learning outcomes, including learning outcomes in learning chemistry. Learning chemistry as part of natural science requires students to use scientific methods in the implementation of learning, which is often done practicum or experiment that is usually conducted by groups or groups. If students cannot work well together, their work will not be maximal. Sometimes these learners experience misunderstandings or misinterpretations of what their classmates are conveying (Syarifatunnisa, 2019).

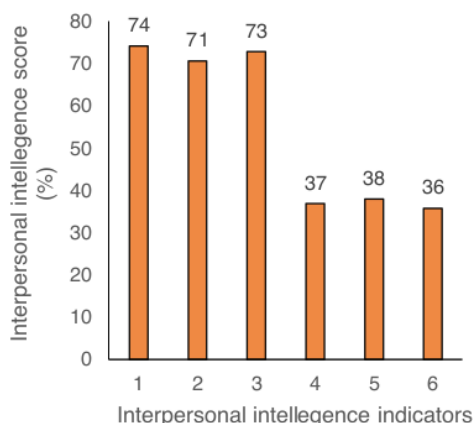
The same data was also found in the self-assessment instrument given to students to assess themselves against interpersonal intelligence indicators. The results are shown in Table 5.

**Table 5.** Recapitulation of students' interpersonal intelligence by self-assessment

Criteria	Number of learners (children)	Percentage of learners (%)
Very high	5	9
High	19	33
Low	32	56
Very low	1	2

There are more than 50% of students who have low interpersonal intelligence. Furthermore, the same results were also shown by Nisa, *et al.* (2019) the low interpersonal intelligence is mostly caused by three main factors, namely lack of interaction and communication within the family, not being accepted in peer groups so that they tend to experience difficulties in socializing and communicating, and trouble working in groups/discussions. In general, students who have low interpersonal intelligence show signs such as; can not get along, like being alone/lacking, lacking sensitivity to friends and the environment, tend to be selfish, challenging to trust others, and sometimes even act in ways that offend others (Ulfah, 2018).

Data recapitulation of observations of students' interpersonal intelligence of each indicator is shown in Figure 1.



**Figure 1.** Observation Results of Students' Interpersonal Intelligence Legend: (1) Collaborate during discussions; (2) Responsible for conducting discussions from the beginning to the end of the discussion; (3) Listen to others when there is a group presenting and when discussing

(question and answer); (4) Asking when the discussion; (5) Answering questions during the discussion; (6) Provide assistance in answering questions during the discussion.

Based on Figure 1, it can be seen that the students' interpersonal intelligence on indicators work together, listen to other people, and are responsible when the discussion is high. In the implementation of the group discussion stage, there is a functional interaction between students and students and students and teachers. Collaboration with group members gives them a sense of responsibility for their learning and the learning of group members (Syarifatunnisa, 2019).

Based on data in figure 1, the next indicator is the aspect of asking questions, answering questions, and providing assistance in answering questions during the discussion. These three aspects are in the low category. The same findings were revealed in the study (Pratiwi *et al.*, 2019) and Palupi *et al.* (2020). Students tend to be still reluctant to ask questions even though they do not understand the material presented by the teacher. This can occur due to (1) lack of space for students to pour the questions that will be asked (the media / LKPD does not provide students the opportunity to develop questioning skills); (2) the learning that is carried out still tends to be teacher-oriented with the teacher still more dominant in mastering learning; (3) learning material tends to be based only on students' books and lacks additional resources from various sources; (4) lack of use of innovative and contextual learning media that is suitable with the subject matter (Susilowati, 2019). Also, the habit or culture that formed by itself in the class that is only a few students who actively asked and answered during the discussion.

#### 4. CONCLUSIONS:

The interpersonal intelligence of high school students in chemistry learning is still low with aspects that are low in their ability to question during discussions, ask questions during conversations, and provide assistance in answering questions during discussions, so in the next chemistry, learning needs to be improved.

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**APPENDIX 1**

**SHEET OF OBSERVATION OF INTERPERSONAL INTELLIGENCE OF STUDENTS**

**Theory:**

**Time:**

**IDENTITY**

Observer Name:

Position / institution:

**Instructions:**

1. The researcher is requested to fill in the practicum time and observer's identity.
2. Following are some statement items to assess students' interpersonal intelligence observed when conducting discussions
3. The researcher is requested to provide an assessment by putting a checkmark (v) in the column provided following the assessment rubric.

Student Code	Assessed Dimensions																				Score total	Information					
	Collaborate during discussion				Responsible for discussion				Listen to others during discussion				Ask during discussion				Answer questions during discussion						Assist in answering questions during the discussion				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			1	2	3	4	

**APPENDIX 2****STUDENTS SELF-ASSESSMENT SHEET**

Name: .....

Class / No: .....

Semester: .....

Hint: Put a checkmark in the score column according to the actual situation.

No.	Statement	Score			
		4	3	2	1
1	I collaborate during discussions				
2	I am responsible during discussions				
3	I listen to other people during discussions				
4	I ask questions during discussions in a class				
5	I answer questions during discussions				
6	I assist in answering questions during discussions				
Score total					

**APPENDIX 3****STUDENTS PEER-ASSESSMENT SHEET**

Name of friend rated: .....

Appraiser's name: .....

Class: .....

Semester: .....

Hint: Put a checkmark (√) in the score column according to its actual whereabouts.

No.	Statement	Score			
		4	3	2	1
1	My friend works together during a discussion				
2	My friend is responsible during discussions				
3	My friend listens to other people when discussing				
4	My friend asks questions when discussing in a class				
5	My friend answers questions during the discussion				
6	My friend assists in answering questions during the discussion				
Score total					

APPENDIX 4

ASSESSMENT RUBRIC SHEET OF OBSERVATION, SELF-ASSESSMENT, AND PEER-ASSESSMENT OF INTERPERSONAL INTELLIGENCE OF STUDENTS

No.	The observed aspect	Criteria	Score
1.	Cooperation (during discussion)	Learners want to work together in solving problems in worksheet (all questions are answered)	4
		Learners want to work together in solving problems in worksheets (all questions are solved) but by managing others.	3
		Learners want to work together in solving problems in worksheet (80% of questions solved)	2
		Students do not wish to cooperate in solving problems in worksheet (50% of questions solved)	1
2.	Empathy processing during discussion (Responsible for discussion)	Learners conduct discussions per the instructions of the teacher with focus (without doing anything else).	4
		Learners conduct discussions under the instructions of the teacher while looking at the work of other groups	3
		Learners conduct analyses by the guidance of the teacher while doing other things (such as talking to different groups of friends, asking other groups about answers)	2
		Students do not conduct discussions following instructions from the teacher but do other things such as playing mobile.	1
3.	Listen to other people (during discussions in 1 class)	Students sit quietly listening and paying attention to other groups who are presenting in front of the class with focus	4
		Students sit quietly listening and paying attention to other groups who are giving in front of the class while doing other things (such as busy themselves with their work / completing assignments at worksheet)	3
		Students sit quietly listening but do not pay attention to other groups who are presenting in front of the class (such as playing cellphones, reading comics, reading novels)	2
		Students do not listen and do not pay attention to other groups who are presenting in front of the class (such as talking to friends, busy alone).	1
4.	Requests and questions (when discussing in 1 class)	Students provide questions and input/suggestions to the group presenting in front of the class	4
		Students give queries but do not offer input/advice to the group offering in front of the class	3
		Students only give input/suggestions to the group presenting in front of the class	2
		Learners do not provide questions and do not provide input/advice to the group offering in front of the class.	1
5.	Give feedback (provide answers to	Students can answer and explain answers to questions raised by other groups appropriately.	4
		Learners can answer and explain answers to questions raised by other groups but are not quite right.	3

	questions) during the discussion	Learners can answer from questions raised by other groups but cannot explain it.	2
		Learners cannot answer and explain answers to questions raised by other groups correctly.	1
6.	Empathy processing (providing help to answer questions) during discussions	Students assist with answers (additional answers as reinforcement) politely (ask permission in advance) and answers given correctly.	4
		Students provide answers to help (additional answers as reinforcement) but are less polite (do not ask permission first), and the answers are given precisely.	3
		Students provide answers (additional answers as reinforcement) but are not polite (do not ask permission first), and the answers given are not appropriate.	2
		Students do not provide help answers (additional answers as reinforcement).	1

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