

Biology Teachers' Readiness in State High Schools in West Sumatra Facing Learning in the Era of the Industrial Revolution 4.0 on Aspects of Communication Skills

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Abstract – This research is motivated by the low knowledge of biology teachers about learning in the industrial revolution era 4.0 and do not yet understand the challenges. The teacher is not maximally applying communication skills when learning. The purpose of this research is to find out and describe the readiness of high school biology teachers in West Sumatra in facing learning in the era of the industrial revolution 4.0 on aspects of communication skills. This type of research is a descriptive study with a population of high school biology teachers in West Sumatra. The research method uses mixed methods by combining quantitative and qualitative research methods. Quantitative data obtained by questionnaire and qualitative data obtained through the interview process. Sampling is done by using the Stratified Cluster Random Sampling technique. The results showed that high school biology teachers in West Sumatra belong to the very prepared category with an average value of 4.43 to all aspects of communication. The Mimic / Facial Expression aspects gave the biggest contribution to the readiness of biology teachers with a value of 4.69. Aspects of utilizing teaching media and technology. For communication, the smallest contribution to the readiness of biology teachers in state high schools in West Sumatra.

Keywords – Teacher Readiness, Industrial Revolution Era 4.0, Communication Skills.

I. INTRODUCTION

Education is an important component in efforts to produce superior generations in Indonesia. To produce this generation, quality education can be realized. According to Permadi (2013: 3), the quality of education is one of the pillars of the development of Human Resources (HR) which has significant significance for national development as a whole.

The results of the PISA (study *Program for International Student Assessment*) in 2015 showed Indonesia's ranking ranked 62 out of 70 countries in the aspect of scientific literacy (OECD, 2016). TIMSS study results in 2015 Indonesia obtained an average value of 397 in the field of science which is also still below the international average value (TIMSS, 2015).

There are many factors which cause low education in Indonesia, ranging from school facilities and infrastructure,

parents' economic conditions, learning environment, family environment, and psychological factors of students. Of the many factors that most play a role in this regard is the teacher (Kurniawan, 2016: 14-17). Teachers are required to be more professional in their work as stated by Fadhli (2017: 224), that teachers are the spearhead in education (process learning) that is dealing directly with students.

The teacher in carrying out his assignment needs to make preparations before the teacher starts teaching like making a teaching plan beforehand, Mulyasa, (2018: 113) that the learning plan is an important thing that must be done by the teacher to support the formation of expected competencies, the teacher can organize the standard competencies that will be achieved in more directed learning and good planning is very helpful for the implementation of learning because in essence if an activity is planned in advance, then the purpose of these activities will be more easily achieved and more successful (Kristiawan et al, 2019: 87).

The presence of the industrial revolution 4.0 makes the world now experiencing increasingly rapid and competitive changes. The characteristic of the industrial revolution 4.0 is the application of artificial intelligence or so-called *artificial intelligence*, technological advancements enable automation in almost all fields. New technologies and approaches that combine the physical, digital and biological world will fundamentally change the pattern of life and human interaction (Tjandrawinata, 2016: 31).

Teachers in the industrial revolution 4.0 era are able to develop learning by integrating four important things, namely strengthening character education, literacy, 4C skills, and *Higher Order Thinking Skills* (HOTS) that require teacher creativity in designing it. One of the important things integrated in the world of education is able to equip students with skills *4C* (*Communication, Collaboration, Critical Thinking* and *Problem Solving*, and *Creativity* and *Innovation*) (Mulyasa, 2018: 4-5).

Communication is a process of transmission, ideas, emotions, and skills by using symbols, words, or numbers, communication can be interpreted as skills that involve listening, observing, speaking, asking, analyzing and evaluating messages to convey messages or information to others through various media (Zubaidah, 2018: 10).

Communication skills play a key role in dealing with life paradigm changes in the industrial revolution era 4.0. The Ministry of Education and Culture 2017 says learning activities that are in accordance with the development of communication (*Communication skills*) can be seen through

discussions to obtain information obtained, express opinions or objections, as well as provide input to the opinions of others (teachers or friends), and communicate various matters relating to learning material, both orally and in writing.

21st century communication skills require students to be able to communicate their thoughts and ideas effectively verbally / verbally, in writing or other non-verbal communication skills in various forms and contexts (P21, 2015) and (Iriantara, 2013: 84-86), said the usual communication between teachers and students is verbal communication and also pay attention to things in nonverbal communication.

Maryanti research (2012: 8), which states communication skills have a significant relationship with learning activities of students and research conducted (Sasmito, 2017), that in fact the learning process used in the classroom generally still does not support the development of communication skills.

Based on observational data from the West Sumatra Provincial Education Department obtained the average value of 52.58 with an average value of UN districts / cities tertinggi is 69.36 and the average value terendah is 42.45. This shows the still low quality of education in West Sumatra Province in Biology.

Preliminary studies conducted on several biology teachers in West Sumatra show that biology teachers do not fully understand the learning of the industrial revolution 4.0 and teachers have not applied learning that can bring up the communication skills of students. Based on this, a study was conducted on the readiness of biology teachers in state high schools in West Sumatra in facing learning in the era of the industrial revolution 4.0 on aspects of communication skills.

II. METHODOLOGY

This research is a descriptive study using *mixed* methods combination. Sugiyono, (2013:19) said that combination research methods combine between quantitative and qualitative research methods to be used jointly in a research activity.

The population in this study is all of the biology teachers of SMA Negeri in West Sumatera. Sampling was carried out using the *Stratified Cluster Random Sampling* Technique by determining the number of samples using the Slovin formula so that a sample of 80 biological teachers was obtained.

Primary Data is obtained through kuesioner and interviews. The Development of the questionnaire began by formulating indicators and selling them in the form of statements. The

scale used in this questionnaire is the Likert scale. The Kesioner used are valid and reliable.

The teacher's readiness will be classified into five modified categories of purwanto (2010:103) as follows.

Table 1. Teacher Readiness Category

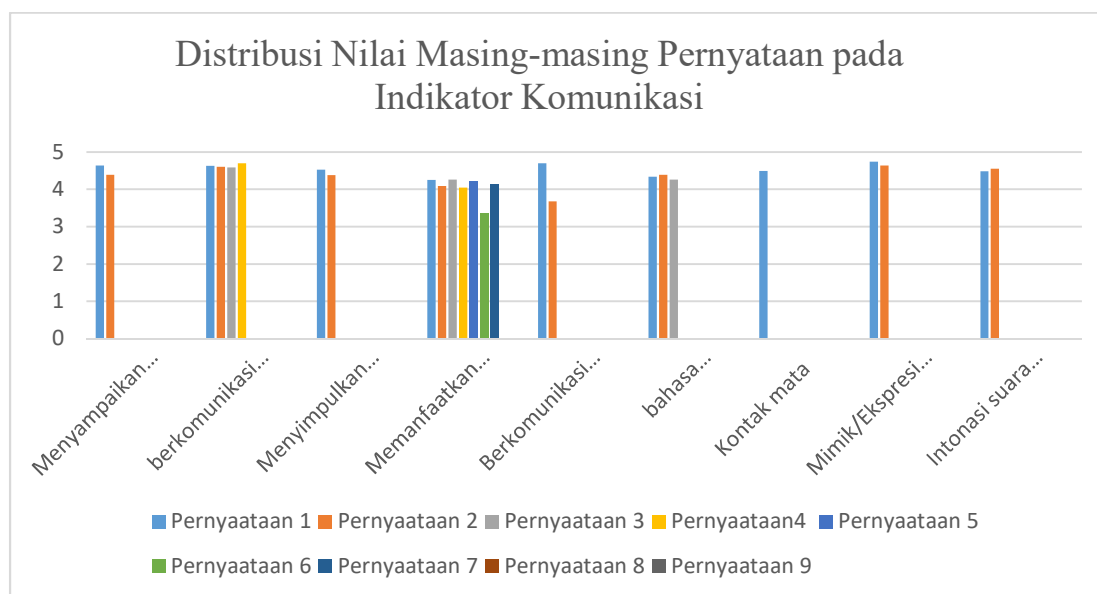
Range of values	Category
4.20-5.00	Very prepared
3.40-4.19	Ready
2.60-3.39	Simply ready

1.80-2.59	Less ready
1.00-1.79	Very unprepared

III. RESULTS OF RESEARCH AND DISCUSSION

The study used a questionnaire that consisted of 25 statements. Here is the distribution diagram of the value of nine statement on eight indicators of communication.

Diagram 1. Distribution value of nine statement



Out of the 25 statements, it obtained the value of readiness of high school biology teachers in West Sumatera in the face

of learning in the era of the 4.0 industrial Revolution on each indicators of communication skills, as follows.

Table 1. The readiness of the West Sumatran high school biology teachers to each indicators of communication

No	Aspects of communication	Value	Readiness Category
1.	Express opinions and ideas appropriately	4,51	Very ready
2.	Communicate to inform, instruct, motivate and invite	4,63	Very ready
3.	Summing up information	4,45	Very ready
4.	Utilizing instructional media and technology	4,05	Ready
5.	Communicate multi-lingually	4,19	Ready
6.	Body language / gestures	4,33	Very ready
7.	Eye contact	4,49	Very ready
8.	Facial / facial expressions	4,69	Very ready
9	Intonation of voice and style of speech	4,51	Very ready
Amount		39,84	Very ready
Average		4,43	

Based on the data above, the readiness of biology teachers in SMA Negeri West Sumatra in facing learning in the era of the industrial revolution 4.0 in the communication aspect, belongs to the category of very ready with a value of 4,43.

There are five indicators of verbal communication skills, namely expressing opinions and ideas appropriately, communicating to inform, instructing, motivating, and inviting, then summarizing information, utilizing instructional media and technology and communicating multi-languages. Non-verbal communication aspects, consisting of four indicators namely body language / gestures, eye contact, facial expressions, voice intonation and speaking style.

The following will discuss the readiness of high school biology teachers in West Sumatra in facing learning in the 4.0 industrial revolution era on communication skills by describing each aspect of communication.

1. Verbal communication (Oral)

Verbal communication is a form of communication that is carried out using symbols or words both oral and written (Khoiruddin, 2012: 123). It can be seen from the results that have been presented that overall the indicators show that the category is very ready. The teacher is able to communicate verbally, such as expressing opinions and ideas appropriately, communicating to inform, instruct, motivate, and invite, and infer information.

The three indicators are included in the category of very ready, but communicating in multi-languages and the use of teaching media and technology are included in the ready category. This is because the teacher does not really use scientific language (Latin) in explaining the material or terms in biology. Teachers only use Indonesian without using other languages in the learning process while the demands of the industrial revolution 4.0 era are communicating in many languages. the use of instructional media and technology with ready categories, but contributes the smallest of the other indicators.

Having technological skills must also be accompanied by the use of technological tools. The technology that teachers often use is *smartphones*, here teachers should also master and have applications such as *email*, *whatsapp*, *classroom* or other applications to facilitate the process of carrying out biology learning because a teacher must be prepared whatever happens if there are problems in the world of education. applications *Smartphone* that are commonly used by young people as a function of communication are social

networks such as *Facebook*, *Twitter*, *Path*, *Instagram*, *Blackberry Messenger*, *Line*, etc. (Nasution, Neviyarni, & Alizamar, 2017: 16).

Teachers during the Industrial Revolution 4.0, are expected to become intelligent, creative teachers, continue to work, and serve as educators. In addition, teachers must have quality and quantity. Teachers during the Industrial Revolution 4.0 should be able to use and manage technology, and be able to create efficient learning processes (Abdelrazeq, Janssen, Tummel, Richert, & Jeschke, 2016: 2). Therefore, teachers must be able to direct the learning process in the direction of skills during the 4.0 Industrial Revolution.

Based on interviews that have been conducted, in several state high schools in districts / cities, that the obstacles faced by teachers are also more directed towards indicators of the use of teaching media and technology, there are several districts / cities that say there are still limited facilities and infrastructure, especially for schools that are still accredited C and the teacher also said that the lack of knowledge about learning about the industrial revolution 4.0 was caused by the teacher still not participating in training or workshops discussing learning in this digital age.

In response to this, teachers must not be technology illiterate (*gaptek*) and must always try to motivate themselves in the world of technology. Indonesia must immediately prepare professional teaching staff, namely educators who are able to use e-learning, because the ability of educators to use technology is one solution to prepare competent millennial generation. This is certainly in line with the opinion of the Menristedikti regarding the preparation of responsive, adaptive and reliable human resources to face the industrial revolution.

The development of teacher professionalism not only includes knowledge about teaching approaches and learning strategies, but also about all knowledge and skills related to the needs of teachers who support training, such as technological knowledge, emotional management, and communication skills (Muhali, 2019: 38).

There are three that are predicted to be skills that are urgently needed in the future or in the industrial era 4.0, namely 1) digital literacy, which aims to improve the ability to read, analyze, and use information in the digital world (Big Data), 2) technology literacy, to provide an understanding of how it works machines and technology applications, 3) human literacy to improve communication skills and mastery of design science (Aoun, 2018: 237).

2. Non Verbal communication

Communication Non-verbal communication is the delivery of messages without words and non-verbal communication gives meaning to verbal communication. Non-verbal communication plays a very significant role during the learning process in the classroom (Butt & Shafiq, 2013: 27). The purpose of using non-verbal communication is to help students understand what is explained by the teacher (Bunglowala, 2015: 372).

In terms of non-verbal communication aspects which consist of four indicators namely body language / gestures, eye contact, facial expressions, intonation of voice and style of speech. Of the four indicators indicate the category is very ready. For the highest average is the expression / facial expressions with an average of 4.69 which is divided into two descriptors by showing happy expressions and smiles. While the smallest contribution to the indicator of body language / gestures with an average of 4.33 which is divided into three descriptors namely using body language with varying positions, walking around the class, and nodding the head when agreeing / affirming students' arguments. The way a person walks, sits, stands and moves shows his expression. Body posture and gait reflect the emotions, self-concept, and level of health (Khoiruddin, 2012: 127).

Facial expressions are usually described through expressions that describe emotions. Facial expressions between teachers and students is an important type of non-verbal language in the classroom (Bunglowala, 2015: 373). Smile is the expression most often used by teachers. Teachers use smiles whenever they appreciate the work of students, when starting learning, in funny situations, smiles can change feelings of sadness into happiness and boredom. A smile is one of the keys of a better teacher-student relationship that makes students less anxious during the teaching and learning process. Richmond, Mc-Crosky and Hickson (2007) state, students from kindergarten to graduate school respond better to smiling teachers.

One of the most important parts of non-verbal communication is eye contact between the teacher and students. Based on the results obtained, the teacher has applied eye contact or eye sight in the teaching and learning process. The teacher regularly sees students when teaching, the teacher makes eye contact with students in class during the lesson, both the teacher and students have eye contact when communicating, the teacher looks more enthusiastic every time he talks with students who are making constant eye contact.

In line with these findings, According to Negi (2009: 107) states that students become more active if the teacher continues to move in class and often make eye contact with students. In line with this statement Behjat, Bahyat, & Kargar (2014: 17) state that teachers make active learning environments through eye contact and students feel alert and take active participation in class. Both of these statements support the findings of this study that eye contact can attract students' attention and make the classroom come alive.

Vocal cues include intonation, voice quality, and vocal emphasis and which can enhance verbal meaning. Based on the research results, teachers are categorized as being very ready, this is indicated because they have used the right intonation and used the right tone of speech in the learning process. Sometimes teachers emphasize their voices to provide clear or important information.

Empirically, there several have been studies that have been conducted regarding the non-verbal communication of teachers in the journal articles Butt & Shafiq, (2013) and Haneef, Faisal, Alvi, and Zulfiqar (2014). These researchers found that facial expressions, eye contact, movements the body, the teacher's voice, and the exact distance between the teacher and students positively influence student motivation, and the learning process.

IV. CONCLUSION

Based on research that has been done, biology teacher in State High School in West Sumatra is very ready to face learning in the industrial revolution 4.0 era on communication skills with a value of 4.43. The Mimic/Facial Expression aspects gave the biggest contribution to the readiness of biology teachers with a value of 4.69. Aspects of utilizing instructional media and technology. For communication make the smallest contribution to the readiness of biology teachers with a value of 4.05. The use of teaching media and technology for communication still needs to be improved by biology teachers.

The teacher is very ready to indicate that the implementation of communication skills has been going well. The results also showed the readiness of teachers to influence the quality of education. This is evidenced by the Bukit Tinggi district which has the highest readiness value but also has the highest UN score compared to other districts in West Sumatra.

REFERENCES

- [1] Abdelrazeq, A., Janssen, D., Tummel, C., Richert, A. S., & Jeschke, S. (2016). Teacher 4.0: Requirements of The Teacher of The Future in Context of The Fourth Industrial Revolution. In *Conference Proceedings of the 9th International Conference of Education, Research and Innovation, Seville, Spain* (pp. 8221–8226).
- [2] Aditama. Haneef, M., Faisal, MA, Alvi, AK, & Zulfiqar, M. 2014. *Peran Komunikasi Non-Verbal dalam Praktek Mengajar*. Sains Internasional, 26 (1). Harmer, J. 2001. *Praktik Pengajaran Bahasa Inggris Edisi ketiga*. Longman Pearson.
- [3] Aoun, J. (2018). Robot-proof : higher education in the age of artificial intelligence. <https://doi.org/10.1080/02607476.2018.1500792>
- [4] Behjat, F., Bayat, S., & Kargar, AA 2014, November 18. *Investigasi Sikap Siswa Terhadap Komunikasi Non-Verbal Guru*. Jurnal Internasional Bahasa dan Bahasa, 2 (Edisi Khusus: Inovasi dalam Pengajaran Bahasa Asing.), 13-18. doi: 10.11648 /2014020601.13
- [5] Bunglowala, A., & Bunglowala, A. 2015. *Komunikasi Nonverbal: Bagian integral dari Proses Belajar Mengajar*. Jurnal Internasional Penelitian Teknologi Advent (Edisi Khusus 1 Konferensi Internasional tentang Tren Advent di Teknik, Sains dan Teknologi "ICATEST 2015"), 371-375.
- [6] Butt, MN, & Shafiq, M. 2013. *Signifikansi Komunikasi Non-Verbal dalam Proses Belajar-Mengajar*. Jurnal FWU Ilmu Sosial, 7, 1- 27. Denzin, N. 2010. *Pengantar Triangulation*. Swiss: UNAIDS. Diane
- [7] Fadhl, M. 2017. Manajemen Peningkatan Mutu Pendidikan. *Jurnal Studi Manajemen Pendidikan*, Vol. 1, No. 2: 216-240.
- [8] Iriantara, Y dan U. Syaripudin. 2013. *Komunikasi pendidikan*. Bandung: Simbiosis Rekatama Media.
- [9] Kurniawan, Z. Y., 2016. Identifikasi Permasalahan Pendidikan di Indonesia untuk Meningkatkan Mutu dan Profesionalisme Guru. *Jurnal Konvensi Nasional Pendidikan Indonesia*. Vol. VIII : 1415-1420.
- [10] Khairuddin. M. A. 2012. *Peran Komunikasi dalam Pendidikan*. Institut Agama Islam Tribakti (IAIT) Kediri. Vol.23 (1) : 118-131
- [11] Kristiawan. M., dkk. 2019. *Supervisi Pendidikan*. Bandung: Alfabeta
- [12] Maryanti, S., Zikra, dan Nurfarhanah. 2012. Hubungan Antara Keterampilan Komunikasi dengan Aktivitas Belajar Peserta didik. *ejournal UNP*. Vol.1, No. 2: 1-8.
- [13] Nasution, J. A., Neviyarni, S., & Alizamar. (2017). Motif Siswa Memiliki Smartphone dan Penggunaannya. *JPPi (Jurnal Penelitian Pendidikan Indonesia)*, 3(2), 15–29.
- [14] Negi, JS 2009, Desember. *Peran Teach- Komunikasi Non-Verbal di Kelas ELT*. Jurnal NELTA, Vol.14, 101-110. doi: 10.3126 / nelta.v14i1.3096 Pintrich, PR, & Tanggal.
- [15] Muhali, M. (2019). Pembelajaran Inovatif Abad Ke-21. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: E-Saintika*, 3(2), 25-50.
- [16] Mulyasa, 2018. *Implementasi Kurikulum 2013 Revisi dalam Era Revolusi Industri 4.0*. Jakarta: Bumi Aksara.
- [17] OECD. 2016. *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy*, PISA, OECD Publishing, Paris. ISBN (PDF) 978-92-64-25542-5.
- [18] Partnership for 21st Century Learning. (2015). P21 Framework Definition. Retrieved September 15, 2018, from http://www.p21.org/our-work/p21-framework/P21_Framework_Definitions_New_Logo-2015.pdf
- [19] Permadi, D dan D. Arifin. 2013. *Panduan menjadi guru profesional*. Bandung: Nuansa Aulia.
- [20] Purwanto. 2010. *Prinsip-prinsip dan Teknik Evaluasi Pembelajaran*. Bandung: PT. Remaja Rosdakarya.
- [21] Richmond, VP, & Mc Croskey, JC, & Hickson, ML 2007. *Perilaku Non-verbal dalam Hubungan interpersonal dalam* (edisi ke-6).
- [22] Sasmito, A., Suciati, Maridi. 2017. Analisis Asesmen dalam Bahan Ajar Biologi terhadap Potensi Pemberdayaan Kemampuan Berkomunikasi Siswa Kelas X. *Pancasakti Science Education Journal*, Vol. 2, No. 2: 104-113.
- [23] Sugiyono. 2013. *Metode Penelitian Kombinasi (Mixed Methods)*. Bandung: Alfabeta.
- [24] Tim Kementrian Pendidikan Nasional. 2017. *Implementasi Pengembangan Kecakapan Abad 21 dalam Perencanaan Pelaksanaan Pembelajaran (RPP)*. Direktorat Pembinaan SMA: Direktorat Jendral Pendidikan Dasar dan Menengah Kementrian Pendidikan dan Kebudayaan.
- [25] TIMSS. 2015. *Science Achievement Eight Grade*. (<http://timssandpirls.bc.edu/timss2011/international-resut-science>), diakses pada 6 Juni 2019.
- [26] Tjandrawinata, R.R. 2016. Industri 4.0: Revolusi industri abad ini dan pengaruhnya pada bidang

kesehatan dan bioteknologi. *Jurnal Medicinus*, Vol 29, No. 1, Edisi April.

[27] Zubaidah, S. 2018. Learning And Innovation Skills untuk Menghadapi Era Revolusi Industri 4.0. *Research Gate*