

Research Article

Are Indonesian Teachers Ready to Face Disruptive Learning? A Case Study from Economic Teachers in East Java

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Abstract.

The readiness of teachers facing the learning era must be investigated because teachers must be creative to improve student's learning experiences. Using the TPACK framework, there is a complex relationship between teachers' knowledge of technology, pedagogy, and content which in the research focuses on economics knowledge. Thus, this study has three objectives. First, to determine the ability, knowing their capacity in age and gender of high school/vocational teachers in East Java. The data were collected from 189 teachers in high schools/vocational in East Java. The collected data were analyzed using a descriptive quantitative method. The main findings revealed that 90% of teachers had high mastery of technology knowledge, nearly a 100% of teachers had high pedagogical competence, and the majority had moderate economics knowledge. Furthermore, based on gender and age, no significant difference was observed in technological knowledge, pedagogy competence, and economics knowledge in East Java high schools/vocational teachers.

Keywords: learning, pedagogy, teacher, technology

1. Introduction

Indonesia has entered an era of disruption, where people are required to think logically and quickly in responding to information that develops through digital systems (Atiah, 2020). Education has a significant role in preparing students to face this era of technological disruption. One way that educational institutions can use it is through the integration of technology in learning activities. The integration of technology in every life aspect, including the education sector in the 21st century, has become an obligation.

Teachers must determine the suitable learning model according to the characteristics of the material and learning strategies (Hidayati et al., 2018). Teachers must also be able to integrate the learning models and systems used with technology. Therefore, teacher

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performance in the era of disruption must be improved. Teachers must be technology literate and master the digitalization of the education system (Rahmawati, 2019). Teachers must be more creative and innovative in designing attractive, fun learning strategies, improving students' critical thinking skills, collaboration, and increasing students' digital literacy (Rahmawati, 2019).

The role of teachers in the era of disruption is vital, so teachers who have professional competence and master technological developments are needed. We can measure teacher professionalism through the framework of technical, pedagogic, and content competencies. TPACK can integrate elements of technology, content to aspects of pedagogic competence (Baran et al., 2011; Schmidt, 2009). TPACK is still rarely developed and researched in economics and business education (Pereira et al., 2018). TPACK teachers, especially economics teachers, are vital in teaching, considering the characteristics of economic subjects that lead students to memorize theory, count, to study economic cycles in a country.

The number of competencies that students must master often causes teachers to 'pursue the target' in delivering the material so that they do not judge the process (Hidayati et al., 2018). TPACK competencies can make it easier for teachers to develop economic learning tools, where TPACK can combine pedagogic elements, financial materials, and technology in learning. Thus, TPACK competence is indispensable in improving the quality of education following the disruptive era. Improving the quality of learning through TPACK competencies must pay attention to the factors that influence the development of teacher TPACK competencies (Hidayati et al., 2018).

These factors include teacher gender and age. Psychologically gender teachers have other developments to affect the competence of TPACK (Rosalia, 2007). Murat (2013) found that gender affected student learning outcomes, and Igwebuikwe (2013) also found that gender affected teacher performance. However, Pratiwi (2016) and Syah (2016) found that gender did not affect teacher competence. This differences between that research become the research problem. Purnamasari et al. (2020) found a positive influence between the number of senior teachers and those with more than bachelor graduates on the 2019 student national exams.

Teachers aged 50 – 59 have good personality competencies (Budi, 2015). Teaching experience significantly affects teachers with less than ten years of work experience, while teachers with more than ten years of performance tend to decrease their competence (Syah, 2016). However, Pratiwi (2016) found no differences in teacher competencies based on age, education level, and teaching experience. Based on the explanation above, it is necessary to research to determine the readiness of teachers to face the

disruptive era with the TPACK framework, which has a complex relationship between teachers' knowledge of technology, pedagogy, and content, which in this study focuses on economic knowledge. Therefore, this study aims to determine the ability and capacity of teachers in the TPACK framework and by age and gender in high school/vocational teachers in East Java.

2. Literature Review

The era of disruption has become enlightenment for Indonesia in revealing the development of science in the academic world (Ohoitumur, 2018). Kasali's disruption theory (2017) suggests that in education, innovation must be carried out on the understanding of humans and their character and fundamental values that are believed to be under the times (Kasali, 2017). In this era, teachers are challenged to master information technology in learning, such as using e-reports, e-modules, holding interactive online exams, organizing creative, communicative learning, increasing student collaboration, and students' critical thinking skills (Retnaningsih, 2019).

Indonesian education is relatively slow in responding to the era of disruptive innovation compared to Singapore and Malaysia, where Indonesia only announced widely about this innovation revolution in 2020 (Handhini & Fitriyanti, 2020). On the other hand, countries on the European continent have been preparing for the change in this disruptive era since 2005, namely by designing learning models and supporting facilities (Tuomi, 2005). As a result, Indonesia's human resources are ranked fifth in ASEAN (Muliawaty, 2019).

Indonesia's unresponding to disruptive learning has impacts teacher competence in following appropriate learning models. The Ministry of Education and Culture held a Teacher Competency Test (UKG) to determine the improvement of teacher competence. The Teacher Competency Test determines technological competence, pedagogics, content knowledge, and national insight. As a result, in 2015, most teachers' UKG scores did not reach the set standard, which was 55, while the average teacher score was only 53.02 (Gunawan, 2018). Therefore, the government must formulate and provide educational facilities that integrate technology with learning (Santos & Castro, 2021). Technological facilities that support technology integration will increase the standard of quality education (Harris & Hofer, 2014).

Quality learning requires a complex understanding of technology, pedagogy, and content and how these three competencies are implemented (Koehler & Mishra, 2009). These three competencies are united in a technological, pedagogical, and content

knowledge (TPACK) framework. It is consisting of teacher competencies related to student facilitation in learning activities from subject matter (content) based on technological and pedagogic approaches (Cox & Graham, 2009). In addition, the TPACK framework develops pedagogical content knowledge (PCK), which Shulman developed in 1986 (Rosalia, 2007).

TPACK is used in research in education to design learning models that integrate technological, pedagogic and content aspects. Koehler & Mishra (2009) mention seven domains in TPACK competence, namely:

Technological Pedagogical Content Knowledge (TPACK), namely knowledge about the interaction between content, pedagogy, and technology).

- Technological Pedagogical Knowledge (TPK) refers to understanding learning change when technology is used in a certain way.
- Technological Content Knowledge (TCK) is knowledge to create a new picture in new material.
- Pedagogical Content Knowledge (PCK) is the urgency of separating content understanding and pedagogy in effective learning.
- Pedagogical Knowledge (PK) is knowledge about in-depth practices and processes when delivering material.
- Technological Knowledge (TK) is teacher knowledge about technology to support teaching and learning activities.
- Content Knowledge (CK) is teacher knowledge of the learning material.

Teacher mastery of TPACK competencies is an obligation in this 21st century disruptive era (Chai, 2013). When teachers have good TPACK competencies, they will positively impact learning activities, such as the development and implementation of learning (Candra et al., 2020). In addition, students will be more interested in learning materials when teachers integrate technology in learning to increase student achievement (Rusdiyah, 2019).

3. Result and Discussion

This research was conducted for two months, from March to April 2021. The method used was quantitative descriptive to identify the characteristics and readiness of Economics Teachers in Indonesia in facing disruptive learning. Determination of the sample during the territorial restrictions in Indonesia makes researchers have a limited area of observation, where researchers can only access three educational regions of East

Java. A selection of 189 high school/vocational economics teachers in East Java, such as Tulungagung, Kediri, and Blitar. Samples were taken by simple random sampling. Data were collected through questionnaires distributed to SMA/SMK via a Google form.

The research measured pedagogic competence, technological knowledge, and economic content of high school/vocational high school teachers in East Java. Furthermore, these results are used to determine whether there are differences in TPACK competencies based on gender and age using the T-test. The age variable in this study was categorized into two categories, namely junior age (20-40 years) and old age (41-60 years).

The TPACK learning strategy is a learning that has been developing for a long time in the world. However, the importance of learning integration with technology during this pandemic reminds the world of education about the importance of implementing this TPACK learning strategy in Indonesia. Starting from a literature review on TPACK written by several researchers with respondents from Indonesia, which incidentally did not explicitly apply the TPACK learning strategy, the researchers tried to find out how the primary conditions of teachers in technology, pedagogy, and scientific knowledge in the field of economics were. The characteristics of respondents in the East Java area are described in table 1 below.

TABLE 1: Characteristics of Respondents.

Category	Description	Number
Age	Junior (20-40) y.o	89
	Senior (41-60) y.o	100
Gender	Man	43
	Women:	146
Area	Blitar:	51
	Tulungagung:	71
	Kediri:	67

Source: Author's own research

The teacher as an educator must have qualified technology knowledge, pedagogical competence, and economic knowledge. Based on the results of research on high school/vocational teachers in East Java, the following results were obtained:

Based on research conducted on high school/vocational teachers in East Java, this research found that 90% of teachers have high skills in technology knowledge. Meanwhile, only 1% of teachers have insufficient technological knowledge. Teachers who have these three competencies will be more aware of and use various strategies and variations of learning models (Harris & Hofer, 2014). Teachers can also develop lesson plans that are centered on students' intellectual abilities. When a teacher does

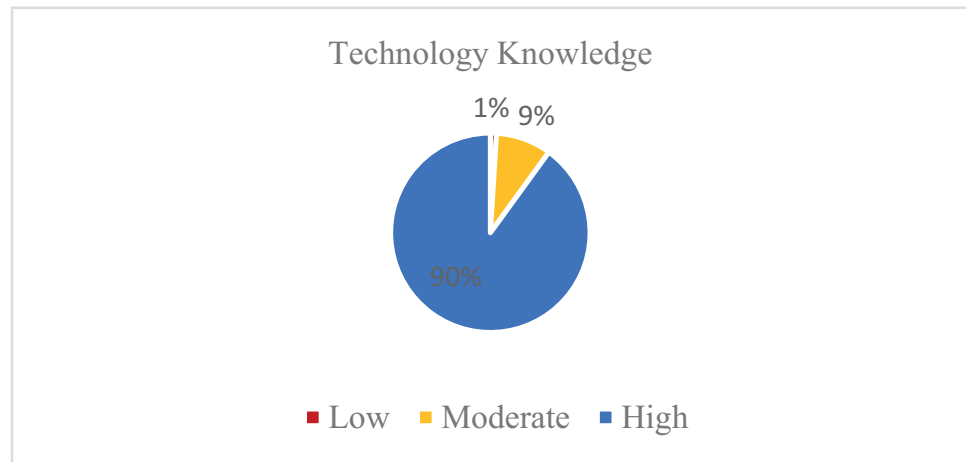


Figure 1: Technology Knowledge on high school/vocational teachers in East Java. Source: Author's own research.

not have qualified competencies in these three competencies, it will result in a mismatch between the lesson plans prepared with the conditions in the classroom so that the teacher does a lot of improvisation when teaching in class (Candra et al., 2020).

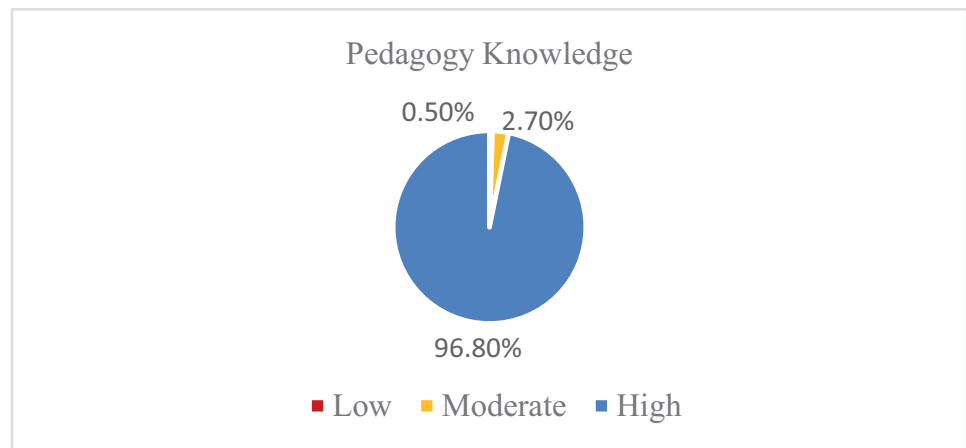


Figure 2: Pedagogy Knowledge on high school/vocational teachers in East Java. Source: Author's own research.

Based on Figure 2, it is known that 96.8% of high school/vocational teachers in East Java have high pedagogy knowledge. It means that they have good expertise in carrying out learning activities, especially in implementing learning methods. In addition, teachers also have a good understanding of the characteristics of their students, good classroom management, and appropriate strategies. It is in line with Rusdiyah (2019), which states that teachers with good pedagogical knowledge can carry out effective learning and classroom management and appropriate strategies according to student characteristics.

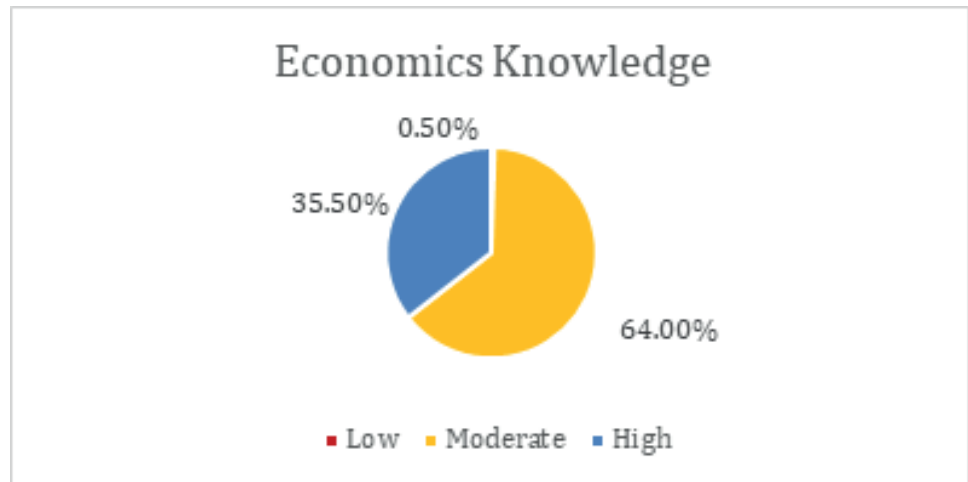


Figure 3: Economics Knowledge on high school/vocational teachers in East Java. Source: Author's own research.

In Figure 3, it is known that most high school/vocational teachers have economics content at a moderate level, reaching 64%. However, only 35.5% have high economic knowledge. It means that high school/vocational, economic teachers in East Java have understood the economic material taught to students well. In line with Rusdiyah (2019), which states that high content knowledge means the teacher already knows the material being studied and will be taught to students.

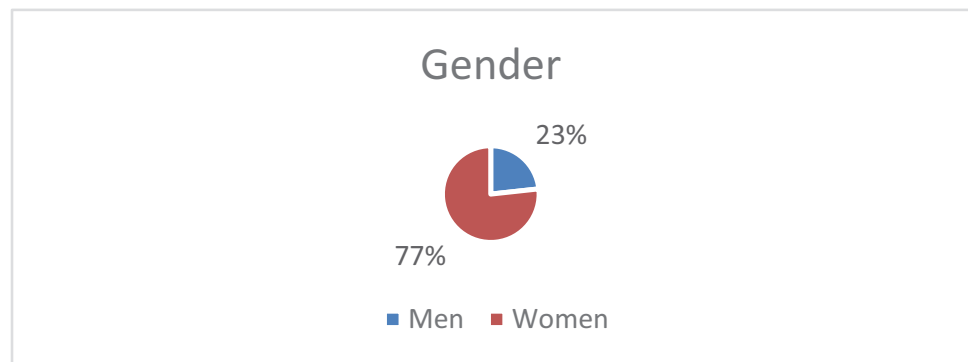


Figure 4: Respondents Gender. Source: Author's own research.

In Figure 4, it is known that most high school/vocational teachers are female, which is 77%. Furthermore, the data will be used to test whether there are differences in technical knowledge, pedagogy competence, and economics content between male economics teachers and female teachers.

Based on the independent T-test results in Table 1, the 2-tailed significance value is $0.71 > 0.05$, meaning no significant difference in knowledge technology skills, pedagogy competence, and economics knowledge for high school/vocational teachers in East Java by gender. These results are in line with Pratiwi, (2016) and Syah (2016), who

Independent Samples Test

		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
TOTAL	Equal variances assumed	.035	.852	.372	187	.711	.621	1.672	-2.678	3.921
	Equal variances not assumed			.395	78.648	.694	.621	1.573	-2.510	3.753

Figure 5: Independent T-test Results Based on Gender. Source: Author’s own research.

found no difference in TPACK for male and female teachers. Therefore, the average TPACK competence of high school/vocational economics teachers in East Java is mainly at a high level, so we can interpret that both male and female teachers have the same competence. However, these results are different from those of Igwebuikie (2013), Murat (2013), and Hidayati et al. (2018), which found that there are differences in the mastery of the three competencies based on gender, where male teachers have better competencies than female teachers.

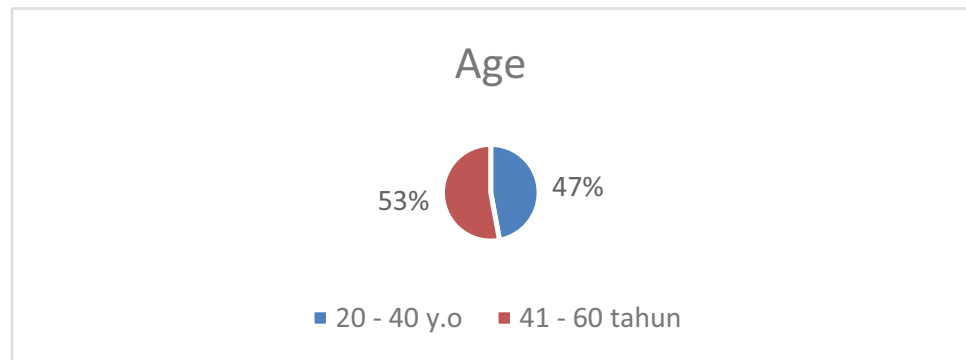


Figure 6: Respondents Age. Source: Author’s own research.

Based on Figure 6, it is known that most high school/vocational economic teachers are aged 41-60 years, which is 53%. It means that the majority of teachers have more than ten years of teaching experience. Next, a T-test was conducted to determine whether there were differences in technology knowledge, pedagogy competence, and economics content for high school/vocational economic teachers based on their age.

Based on the T-test results in table 2, the two-tailed significance value is 0.538 > 0.05. It has meant that there is no significant difference in knowledge technology skills, pedagogy competence, economics content for high school/vocational teachers in East Java-based on age. It happens because the majority of teachers already have TPACK at moderate to high levels, so that age and teaching experience are not the

Independent Samples Test

		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
TOTAL	Equal variances assumed	.035	.852	.372	187	.711	.621	1.672	-2.678	3.921
	Equal variances not assumed			.395	78.648	.694	.621	1.573	-2.510	3.753

Figure 7: Independent T-test Results Based on Age. Source: Author's own research.

main determining factors in TPACK. Teachers with more than ten years of teaching experience can adapt and keep up with technological developments.

Meanwhile, junior teachers also have good pedagogical competence, technology knowledge, and economics content after university. It is in line with Pratiwi's research (2016), which found no difference in teacher competence based on age. Meanwhile, Budi (2015) and Syah (2016) found different results, where age affects teacher competence. Syah (2016) found that teachers with more than ten years of teaching experience would experience decline incompetence, while Budi (2015) found that the best teacher competencies were at the age.

4. Conclusions

Based on the analysis of research data, it is known that 90% of economical high school/vocational teachers in East Java have high technological mastery, 96.8% have high pedagogic competence, and 64% have moderate economic knowledge. In addition, it is also known that there is no significant difference in the TPACK of high school/vocational economics teachers in East Java-based on age and gender. However, this study has limitations on restricted access, so this study only represents the condition of teachers in the East Java region. There is a potential difference in results if this quantitative descriptive analysis is carried out in areas with technological development conditions under the three areas that are the object of observation, which may be developed in further research.

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References

- [1] Atiah N. Pembelajaran Era Disruptif Menuju Masyarakat 5.0. Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang; 2020.
- [2] Baran E, Chuang HH, Thompson A. TPACK: An Emerging Research and Development Tool for Teacher Educators. *Turk Online J Educ Technol*. 2011;10(4).
- [3] Budi MH. Korelasi antara Usia Guru dengan Kompetensi Kepribadian di MTs Negeri Babadan Pangkar Ngawi Tahun 2014/2015. UIN Maulana Malik Ibrahim Malang; 2015.
- [4] Candra PN, Soepriyanto Y, Praherdhiono H. Pedagogical Knowledge (PK) Guru dalam Pengembangan dan Implementasi Rencana Pembelajaran. *Jurnal Kajian Teknologi Pendidikan*. 2020;3(2):166–77.
- [5] Chai CS. A review of technological pedagogical content knowledge. *J Educ Technol Soc*. 2013.
- [6] Cox S, Graham CR. Diagramming TPACK in Practice: Using and elaborate model of the TPACK Framework to Analyze and Depict Teacher Knowledge. *TechTrends*. 2009;53(2):60–9.
- [7] Gunawan R. Analisis Technological Pedagogical Content Knowledge (TPACK) pada Guru Ekonomi di Kota Cirebon. Universitas Pendidikan Indonesia; 2018.
- [8] Handhini LS, Fitriyanti E. Tantangan Menjadi Guru di Era Disruptif. Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang; 2020.
- [9] Harris JB, Hofer MJ. Technological Pedagogical Content Knowledge (TPACK) in Action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. *J Res Technol Educ*. 2014;43(3):211–29.
- [10] Hidayati, N., Setyosari, P., & Soepriyanto, Y. (2018). Kompetensi Technological Pedagogical Content Knowledge (TPACK) Guru Soshum Setingkat SMA. *JKTP*, 1(4).
- [11] Igwebuike T, Okandeji CO, Onwuegbu OC. Interactive influence of experience, qualification, and gender on elementary school teachers' attitudes towards external supervision of instruction. *International Journal of Research Studies in Education*. 2013;2(3):3–13.
- [12] Kasali R. Tak Ada yang Tak Bisa Diubah Sebelum Dihadapi, Motivasi Saja Tidak Cukup. Gramedia Pustaka Utama; 2017.
- [13] Koehler M, Mishra P. What is technological pedagogical content knowledge (TPACK)? *Contemp Issues Technol Teach Educ*. 2009;9(1):60–70.
- [14] Muliawaty L. Peluang dan Tantangan Sumber Daya Manusia di Era Disrupsi. Kebijakan: *Jurnal Ilmu Administrasi*. 2019;19(1):1–9.

- [15] Murat A. Gender and experience as predictor of biology teacher education process self-efficacy perception and perception of responsibility from student success. *Int J New Trends Educ Their Implic.* 2013;4(3).
- [16] Ohoitumur, J. (2018). Disrupsi: Tantangan bagi Perkembangan Ilmu Pengetahuan dan Peluang bagi Lembaga Pendidikan Tinggi. *Respons*, 23(2).
- [17] Pereira RQ, Nasu VH, Nganga CS, Nogueira DR. (2018). TPACK and business education: A review of literature (2008 - 2017). XVIII USP International Conference in Accounting. Pratiwi, N. W. (2016). Kompetensi Guru SMA Berdasarkan Jenis Kelamin, Usia, Pengalaman Mengajar, dan Tingkat Pendidikan. Universitas Sanata Dharma.
- [18] Purnamasari, D., Firdaus, R. A., & Akuba, S. F. (2020). Pengaruh Usia dan Tingkat Pendidikan terhadap Hasil Kinerja Guru berdasarkan Nilai Ujian Nasional Siswa. *Islamic Education Management*, 5(2).
- [19] Rahmawati NH. (2019). Profesionalisme Guru di Era Teknologi Disrupsi. *ISOLEC Proceedings*.
- [20] Retnaningsih, D. (2019). Tantangan dan Strategi Guru di Era Revolusi Industri 4.0 dalam Meningkatkan Kualitas Pendidikan. *Prosiding Seminar Nasional: Kebijakan Dan Pengembangan Pendidikan Di Era Revolusi Industri 4.0*.
- [21] Rosalia Y. Pengaruh Jenis Kelamin terhadap Hubungan Antara Persepsi Mahasiswa tentang Profesi Guru. Universitas Sanata Dharma; 2007.
- [22] Rusdiyah EF. *Teknologi Pembelajaran: Implementasi Pembelajaran Era 4.0*. UIN Sunan Ampel Press; 2019.
- [23] Santos JM, Castro RD. Technological pedagogical content knowledge (TPACK) in action: Application of learning in the classroom by pre-service teachers (PST). *Soc Sci Humanit Open*. 2021;3(1):3.
- [24] Schmidt DA, Baran E, Thompson AD, Mishra P, Koehler MJ, Shin TS. Technological pedagogical content knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *J Res Technol Educ*. 2009;42(2):123–49.
- [25] Syah MF. Pengalaman, Jenis Kelamin, dan Tingkat Pendidikan: Apakah Mempengaruhi Kinerja Guru Ekonomi/Akuntansi di Kabupaten Semarang, Kota Salatiga, dan Kota Semarang. *Seminar Nasional Pendidikan*; 2016.
- [26] Tuomi I. The future of learning in the knowledge society: Disruptive changes for Europe by 2020. *Background Paper Prepared for DG JRC/IPTS and DG EAC*; 2005.