Investigating Teachers' Approach to Science Subjects in Indonesian Religious-Based Schools: A Case Study

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Author:

Nur Atika

04242110017

FACULTY OF EDUCATION

UNIVERSITAS ISLAM INTERNASIONAL INDONESIA

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Author

Nur Atika

04242110017

Faculty of Education

Universitas Islam Internasional Indonesia

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Nur Atika
04242110017
nur.atika@uiii.ac.id

ABSTRACT

Modern secular Western thought tends to remove elements of religion in every dimension of life, including education. Religion is suspected to prevent people from learning science and predicts a negative attitude toward science. The religious institution is believed to practice a teaching approach that does not emphasize a learner-led transformative process.

Although much research has been conducted on the teaching approach, viewing the teaching approach from an Islamic pedagogy framework has yet to be addressed. Islamic pedagogy emphasizes a learner-focused approach, it can flourish students' critical thinking and reasoning thinking. Thus, the researcher aimed to investigate the teacher's approach to teaching in an Islamic high school in Riau, Indonesia.

The researcher used a case study design to investigate how the science teacher's approach to teaching science with Islamic values in an Islamic high school. With the three research questions, the researcher wanted to analyze the Islamic high school teachers' perceptions toward science education concerning religion, investigate the science teacher's approach to instructing science in the classroom, and investigate the science subjects' resources in the Islamic high school. The finding of this research provides empirical evidence of science teachers' approach, which supports the idea that Muslims need a clear concept of education. Participants consisted of six teachers and four students in the science class major. Six classrooms were observed, and four lesson plans and several official documents were analyzed.

In summary, the result of this study showed that science teachers perceive science as not contradicting religious beliefs and believe that their faith supports them in learning science. In addition, all teachers in this school are used to relating religion with science learning in the classroom by mentioning some verses and hadith related to materials. The researcher also found that stating God's greatness in a natural arrangement is also regarded as relating science with religion.

A further finding indicated that the science teaching approach in this Islamic High school, where the teachers are Muslim, is categorized into two types; teacher-led and student-led. In addition, the Islamic values of education seem to be not recognized as a pedagogical approach in this school.

The next finding of this research is that the learning resources for science learning in this school are unlimited. In addition, the teachers utilize the teacher's forum as their resource for creating their modified teaching module. The freedom of learning from everywhere is a sign that this school gives authority to each member to filter by themselves.

The researcher hopes that another study will be conducted to provide more empirical evidence about science pedagogy related to Islam. The research about what factors impact teachers' approach to teaching is also recommended to provide an idea of how to have a compact teaching approach.

Keywords: *science, education, Islamic senior high school, teaching approach, religion, Indonesia*

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DEFINITION OF TERM

Deen	Religion
Fiqh	Islamic jurisprudence
Hadith	The saying of the prophet
Kitab kuning	Classical Arabic text
Madrasah	Islamic Schools, under the Ministry of Education
Qur'an	Sacred scripture of Islam
Smart classroom	Classrooms which teaching content can be optimized to facilitate the acquisition of learning resources to promote classroom interaction, with situational awareness and environmental management functions (Yu et al., 2019)
Syariah	Islamic law
Tahfidz	Qur'an memorization
Tarbiyah	The Arabic word of Education

ABBREVIATION

DAPODIK	*Data Pokok Pendidikan* (Main Education Data under MoEC)
IPA	*Ilmu Pengetahuan Alam* (Natural Science)
KD	*Kompetensi Dasar* (Basic Competence)
KKG	*Kelompok Kerja Guru* (Teacher Forum)
KSM	*Kompetensi Sains Madrasah* (Madrasah's Science Competence)
LKPD	*Lembar Kerja Peserta Didik* (Student worksheets)
MAN	*Madrasah Aliyah Negeri* (State Islamic High Schools)
MGMP	*Musyawarah Guru Mata Pelajaran* (Subject Teacher Conference)
MoRA	Ministry of Religious Affairs
MTs	*Madrasah Tsanawiyah* (Islamic Middle School)
PAI	*Pendidikan Agama Islam* (Islamic religion education)
PhET	Physics Education Technology
PPT	PowerPoint
SIMPATIKA	*Sistem Informasi Pendidik dan Tenaga Kependidikan* (Information System for Educators and Education Personnel under MoRA)
SMP IT	*Sekolah Menengah Pertama Islam Terpadu* (Integrated Islam middle School)
TTS	*Teka Teki Silang* (Crossword puzzle)

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CHAPTER I

INTRODUCTION

1.1 Study Background

Modern secular western thought tends to remove elements of religion in every dimension of life, including education (Edison et al., 2021). The separation of knowledge and religion that westernization brought caused so many logical ideas and theories that were contradictory to the true teaching of Islam and also confronted with the true teaching of the Bible (Abubakar et al., 2016). Its confusion results in its implementation, which seems in the segregation between science and religion that still cannot be vanished up to now. According to Chan (2018), countries dominated by the unaffiliated have a more positive orientation toward science than those countries which affiliated to religion. Therefore, religiosity is associated negatively with trust in scientific authority. In line with this research, McPhetres & Zuckerman (2018) conclude that there is a relationship between being religious and having a lower level of science literacy; religiosity and science tend to be contra. Therefore, religion is believed to prevent people from learning science and predicts a negative attitude toward science.

However, Scheitle et al. (2018) revealed that religiosity is also a strong predictor of someone seeking scientific information from religious sources. It does

not discourage them from seeking scientific knowledge from other sources. Furthermore, Ecklund et al. (2016) found that scientists who lack religious service attendance agreed that science does not conflict with religion, and neither are religious people. Therefore, a negative attitude toward science is not related to religiosity. It means that religiosity is not a predictor of rejecting science.

In 2017, Uecker and Longest investigated the perceptions of religious people regarding their religious instruction. This study discovered that attitudes about science are diverse. People with the strongest religious faith would have two types of scientific attitudes: one who incorporates scientific knowledge into their spiritual perspective and the other who rejects scientific knowledge that directly opposes their religious beliefs. This finding gave a new perspective on understanding the relationship between religion and science. It shows us that the perspective of understanding religion is so complex when dealing with science.

However, the global findings mentioned above studying on science in general context, not specifically in education, while the education plays an important role to create society. The development of adolescents' societal interest is influenced by the fact that teachers are the most influential socializing agent in school (Wanders et al., 2021). Therefore, it is necessary to investigate teachers' perceptions, specifically based on their religiosity.

According to Pickens (2005), perception is closely related to attitude; perception is the general awareness (subjective) of things, whereas attitude is how a person approaches things based on a subjective evaluation of how they will

influence them. Therefore, perceptions matter because how people perceive and interpret a situation influences their attitudes, characteristics, and behaviors.

Educational researchers have conducted a lot of research to investigate teachers' perceptions of science based on their religion. Billingsley et al. (2014) investigated teachers' perspectives on the topic that bridges science and religion. Teachers in this research admitted that the current curriculum does not bridge religion and science well. While bridging science with religion subject depends on the teacher's perspective on both topics. Simultaneously, another research by Carvalho (2016) found that some science teachers refused to teach about what might be considered a controversial topic with their religious beliefs. For example, research by Silva & Mortimer (2020) found that a secular country that accepts and encourages religion, such as Brazil, has more frequent classroom conflict than classrooms in Argentina (a country that sets Catholicism as its official religion) or Uruguay (a consolidated secular country). Argentinian and Uruguayan teachers see that science and religion are independent of each other, so they teach biology as part of the curricula without interference from religion. It means that most teachers agree that their perspective of faith affects how they teach science. These three pieces of research show us the importance of the explicit curriculum in the school, which provides teachers to manifest their religiosity in science teaching with a unified guideline because it is important for the institution to equip educators with a clear guideline for curriculum in their courses and classrooms (Suryadi et al., 2018). Thus, integrating science and religion is believed to help science education

teachers to deal with this problem (Edison et al., 2021; Ramadhani et al., 2020; Stones et al., 2020; Suciati et al., 2022; Sunhaji, 1970).

However, there is a debate on the concept of integrating science and religion. For example, Rahmatullah (2016) argues that the integration of general science and religion in Senior High Schools/Islamic Senior High Schools is still limited to justifying Quranic verses but does not include the actual science of Islam. Integration does not necessarily mean only tackling Qur'anic verses to be the material of science learning, but the actual teaching of Islam also instructs humans to read and think. Because according to Khaldun (1967), there are two types of knowledge according to Islam: one is the knowledge obtained from philosophical science (thinking and reasoning), and another is the knowledge obtained from the traditional science of; Qur'an and sunnah. Traditional science is absolute; there is no place for intellect in them, but to use it, needs to be related by analogical reasoning. Such analogical reasoning is also derived from the conventional information/basic principle. Therefore, the philosophy of science does not contradict traditional science, in opposite, it convinces the arguments in traditional science.

Another concept of integrating science and religion is explained by Sururin et al. (2021). She argued that the concept of integration in Faculty of Educational Sciences UIN Jakarta is observed in two types: contextualize teaching materials with relevant verses and or use the verses of the Qur'an to be discussed based on the scientific explanation. This argument means that the understanding of

integrating science and learning must use Qur'anic verses in the teaching material; without it, there will be no integration.

Altogether, the interpretations above provide a wider picture that science integration might be found in science teaching. The researcher argues that merely associating certain verses as teaching material as the meaning of actual teaching of Islam is indirectly dichotomized between science and religion. The actual teaching of Islam is more comprehensive than that; to think critically, productively, and openly, use the grace of reason to believe and think about God's creation, reflect, explore, and manage it for the welfare (Sahin, 2018).

According to Smith (2018), faith could influence pedagogical practice. The nature of religious beliefs allows the practice to be applied in the humanities aspect and the wider area that exists in the 21st century (Klanderman, 2022). Numerous researchers have attempted to apply the concept of faith-influenced pedagogical practices to their related fields, including science (Meehan, 2007), technology (Crisman, 2015; Normal, 2015), and mathematics (Eggleton, 2019; Wilkerson, 2015; Zonneveld, 2015). The key is whether the teacher could be actively involved in the formation of professional knowledge because they are responsible for the children's education, and it is supposed to be a progressive pedagogical approach (Sultanov, 2022).

The teaching approach is "the combination between the teacher's intention of teaching and the teacher's strategy" (Trigwell & Prosser, 1996, p.78). The student-centered approach focuses on teaching students how to think, not just how to memorize. It allows students to think about their learning, examine their

questions, and work with their peers and teachers. This approach helps students improve at solving problems, talking to people, and discovering more about things (Sultanov, 2022).

However, Pardjono (2016) uses the term active learning to explain the student-centered approach. Active learning places students at the center of course goals and outcomes (Malhotra, 2017). Student-centered learning increases student engagement and helps them take ownership of learning (Morel, 2021). The earners work by themselves with teacher's guidance; and the learning begins with a consideration of learners' prior knowledge, skills, and experiences (Bremner, et al., 2022). The widespread adoption of the active learning approach was hampered by initial resistance from educators utilizing the more conventional lecture-based instruction (Burke et al., 2020). In this way, teachers in religious institution can spread the idea thaActive learning places students at the center of course goals and outcomes.t education should be open to everyone, or better yet, should be open to everyone from the start (Baldelomar, 2020).

In a religious institution, the practice of active learning is still less. For example, a study by Everington (2007) found that a Christian teacher may present a particular interpretation of a Christian doctrine and practice as "the accepted meaning" rather than as merely one interpretation of religious teaching, where the pedagogical practices in varied disciplines should be aligned with the underlying faith commitments (Klanderman, 2022). This practice happens in other religions too. Sahin (2018) states that in Islamic Education, the transmission, indoctrination, memorization, and instruction are often perceived as Islamic values of education.

In Hindu, the education system is listening to the teacher's teachings, contemplating what the teacher teaches, and realizing or practicing the teacher's teachings (Astawa, 2018).

In Indonesia. the progressive pedagogical practices are still limited; it has been implemented in several schools (Panjaitan, 2014). To the extent of the researcher's knowledge, no empirical study has been found yet that discusses the implementation of science teaching in the Islamic context. Most of literatures that researcher found provides concept on ideal education according to Islam (Attas, 1970; Faruqi, 1987; Memon, 2011; Sahin, 2017; Sahin, 2021), merely discussed about the implementation of student-centered approach for science education without relating with Islamic concept about education (Triyoko, 2012; Ekawati, 2018; Huda & Lubis, 2019; Ratnasari et al., 2020; Siswanto & Mbato, 2020; Wulandari, 2020; Firmani et al., 2022), or relates it with Islamic values but limited to moral values and scientific information (Elhoshi et al., 2017; Fahyuni et al., 2020; Hasanah et al., 2022; Maisaroh, 2022). Therefore, this research tries to fill this gap by investigating the science teacher's approach to science subjects in public secondary school under the ministry of religious affair to contribute to future empirical research in science teaching within Islamic pedagogy context.

1.2 Research Questions

This study focused on the approach to teaching science in Islamic senior high school that is composed of Muslim teachers and students in a Sumatra school. Specifically, the following question guided this study:

1. How do Islamic-based school teachers perceive science subjects in relation to religion?
2. How do teachers implement their teaching approach in teaching science in the classroom?
3. How do science learning resources in Islamic-based school be chosen?

1.3 Aim of Research

Based on the research question above, the researcher would like to pursue three aims:

1. To analyze the Islamic high school science teachers' perceptions toward science education concerning religion.
2. To investigate the science teacher's approach to instructing science in the classroom.
3. To investigate the science subjects' resources in the Islamic senior high school

1.4 Significant of the Study

The finding of this research provides empirical evidence on science teachers approach to teaching practice which supported the idea that Muslim needs a clear concept about education. With a limitation of classroom observation method in this study, it is indicated that empirical evidence which studying sciences pedagogy related to Islamic pedagogy is still needed to be improved. However, this study will contribute to researchers in the future, especially those who are in the field of science teaching in Islamic-based school.

CHAPTER II

THEORETICAL FOUNDATION

2.1 Introduction

In this chapter, the researcher will discuss issues related to the main principles of this research based on literature review collected. First, the researcher explains the paradox that happened between science and religion. Second, the researcher explores the development of science subject teaching-related religion along with time. Third, the researcher demonstrates on how the teacher's approach to teaching related to teacher perception. Finally, the researcher elucidates the pedagogy of science teaching, includes types of approaches to teaching, the essence of science teaching, and the classroom environment.

2.2 Science versus Religion: are they opposite?

Humans are the only creature that has the ability to think and reflect. God gave humans something far more powerful than any weapon or claw. Over the years, we have sharpened our senses and developed a local intelligence for protection issues. The ability to engage in discussions, interact about their thinking to provide solutions sets humans apart from other species. It is the foundation of survival that has helped humanity for centuries and will be continued in the same way. Education based on the Islamic perspective does not limit the science to mere Islamic studies;

otherwise, it should be philosophically developed by keeping holding on Qur'an and Hadith. The greatest gift, the ability to think and reflect according to what humans have seen, heard, and experienced, should be maximized in advancing science and technology and taking advantage of it correctly (Khaldun, 1967).

There are some questions that science cannot answer right now and some problems that science cannot solve. "How uncertainties in scientific knowledge and ideas change over time, and what role the scientific community plays in validating these changes" (QCA, 2009). Science is not perfect, and it's not impossible, though it's unlikely, that a scientific disagreement between science and religion could be resolved in the future in favor of religious reading.

According to Reiss (2010), religious scriptures (Christians, Hindus, Muslims, and others) are a reliable source of scientific information. Further he stated that many things in the religious knowledge worldview are not supported by science, but religious knowledge always has a fundamental knowledge of science. Therefore, in this sense, the researcher agrees with Reiss's (2010) idea that religious knowledge includes scientific knowledge and that scientific knowledge is a part of religious knowledge.

To understand about how the religion and science seems to be in a different path, the researcher tucks a study from Bretl (2020) as a parable. This study was conducted by sharing fantastical stories involving impossible events with religious and non-religious raised children. This study shows that children are naïve to new information that contrasts with their beliefs, where somehow it can explain how the religion seems to be in opposite with science. The study found that the non-religious

raised children cited the protagonist as not real, and it does not mean that nonreligious-raised children are more skeptical than religious-raised children, but it rather explains how it happened by the social-cultural influence. Social factors heavily influence this skepticism of non-religious and acceptance of religious children. When parents come from a culture that emphasize belief in religious doctrine, their children are more likely to interpret the protagonist from improbable stories as real people in societies, while parents who come from a culture that does not emphasize belief, the children are more likely to cite the protagonist as not real.

And so do science and religion in education; a higher level of scientific activity overstates the value of exposure to science. The exposure to religious belief may overstate the contribution of religiosity to the development of trust in religious societies, and so does in science. So, it is not true that religious people tend to be less scientific due to the taught that religion has that hinder them, but the truth is that religious people tend to be less religious, and scientists tend to be less scientific because of the imbalance in the learning process (O'Brien & Noy, 2018).

The regional context plays an important role in the science-faith interface. In the western country, the religious see science and religion as conflict. In contrast, for the religious majority in the eastern country, the scientists see that science is not necessarily secularizing at the individual level and science does not have a secularizing effect on them, but it also means that it is aligned (Ecklund et al., 2016). Young adults with the strongest religious faith might incorporate scientific knowledge into their religious perspective or reject scientific knowledge that directly contradicts their religious beliefs. In a certain circumstance, where the

young adults who see science and religion as separate institutions, are also more likely to have a lower level of religious commitment. These findings are the supporting argument that social differentiation's role secularizing people (Uecker & Longest, 2017). So, we can claim that the lack of faith in science from religious people is not a result of curiosity or ignorance but rather is based on theological or institutional misgivings (Johnson et al., 2015).

The depiction of Islamic education in nowadays understanding ignores Islam's educational understanding and the historical experience of early Islam and the West. It ignores the Qur'an's and prophetic tradition's open educational attitude, which led early Muslims to be curious about other cultures. The incompatibility of Islamic education compared to Western education is often or almost stated but forgotten to analyze from its foundational assumption of binary truths (Sahin, 2019). Muslims are nowadays often proud to say that classical Muslim thinkers influenced key figures of the European Enlightenment, but we never or almost forget to ask the important questions; how the degradation could be happened, and how can we achieve it again (Sahin, 2021); Modern Muslims can take inspiration from the important part of Islam's educational legacy, combining faith and reasoning. The answer to what keeps modern Islamic higher education nowadays from being innovative is what can help the Muslim societies themselves.

Therefore, if Muslims nowadays re-apply the forgotten traditions of Islamic pedagogic, curiosity, and critical openness to inspire a new dialogue, Muslim Islamic education will be capable of acknowledging and recognizing the reality of

the world by drawing on evidence suggesting the presence of a shared reflective, critical educational heritage between Islam and the West.

2.3 Teaching Reference in Science Subject-Related Religion (The Development)

In the 1800s, people realized how important it was for secondary schools to teach science (Richard, 2012). After the widespread importance of science literacy, the first goal was to make sure that people had a better understanding of how science and technology work and how they can be used to keep and improve our way of life. The second is cultural, scientific literacy, which comprehends science as a major human accomplishment and acts as an integral part of our general culture (Hetherington, 1982).

However, Montagu (1984) asserts that science cannot learn anything about the supernatural in religion, such as the explanation of the first humans' creation, the universe's formation, etc. It is because science is limited or incapable of obtaining knowledge about it. So, it is incorrect that modern science must rule out divine guidance because religion is irrelevant but more to its limitation, which supports the idea that science is always developing.

However, according to the study by Ogunniyi et al. (1995), The teachers' beliefs about the world might affect how they teach science. Science teachers may or may not inform their pupils of the difference between what they believe and what they teach. It means that a learner still needs to get the same idea that the scientific worldview is not just an abstraction but rather something that applies to everyday life.

In 2014, Billingsley et al. investigated teachers' perspectives on the topic that bridges science and religion. Teachers in this research admitted that the current curriculum does not bridge religion and science well. Bridging science with religion depends on the teacher's perspective on both topics. Some science teachers refused to teach about what might be considered a controversial topic with religious beliefs (Carvalho, 2016). Thus, the integration between science and religion becomes the focus of teachers by including religion in science teaching.

However, in the same year 2014, a researcher named Sibel Erduran also tried an effort to broadening the discussion of nature of science to be more flexible and inclusive which opens new spaces for research and development in science curricula, teaching, learning, and teacher education (Erduran & Dagher, 2014). It means that. this concept giving more space to religion to contribute its values about education. By implementing this concept, teachers in religious schools will be able to spread the idea that education should be open and available to everyone (Baldelomar, 2020). Because to think critically and use of reasoning thinking is also taught in Islamic values of education (Sahin, 2018). Thus, the main idea of relating religion and science can be focus on faith which is supports the science education.

According to Smith (2018), faith could influence pedagogical practice, the concept of faith-influenced pedagogical practices to their related fields. Klanderman (2022) stated that the nature of religious beliefs allows the practice to be applied in the humanities aspect and the broader area that exists in the 21st century, such as how it has been done in science (Meehan, 2007), technology

(Crisman, 2015; Normal, 2015), and mathematics (Wilkerson, 2015; Zonneveld, 2015).

2.4 Beliefs Influence Teaching Approach (the complexity)

Kember (1997) studied the complexity between teaching conceptions, teaching approaches, and learning outcomes. This complexity can be shown in Figure 2.1.

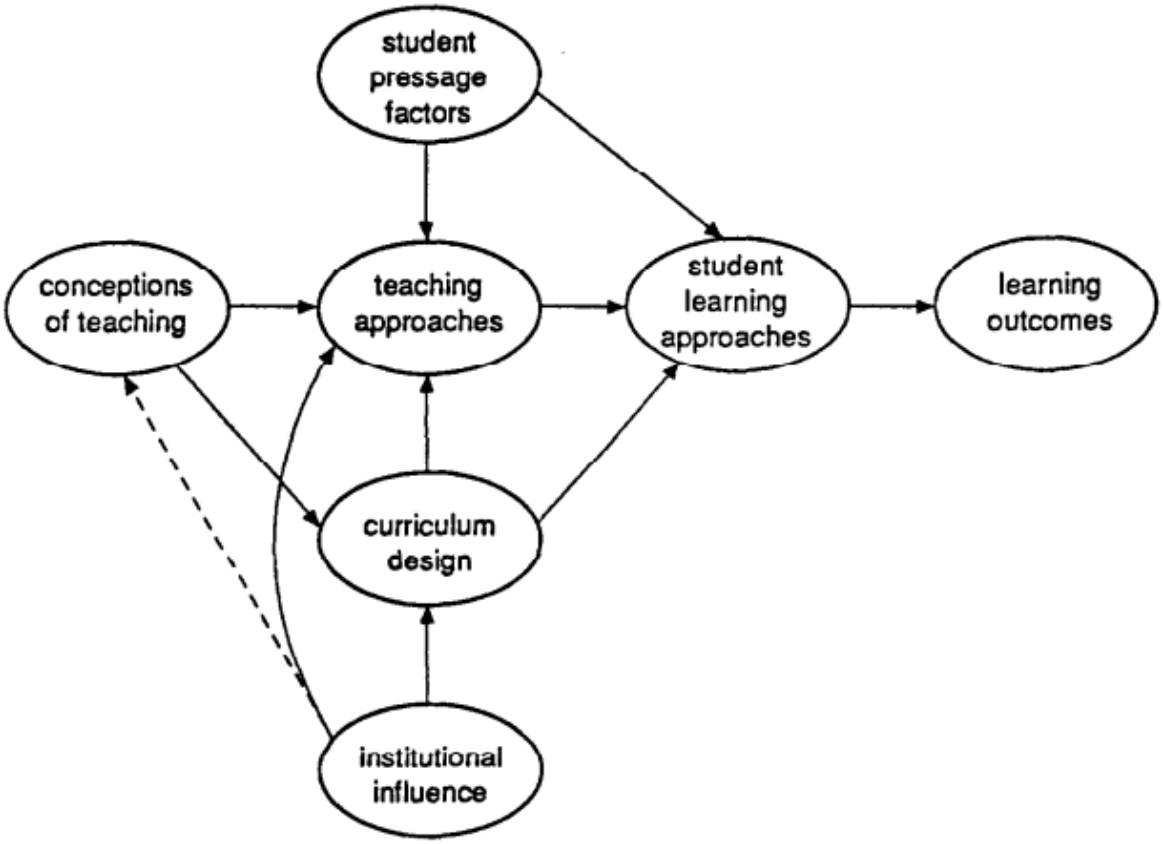


Figure 2.1.

The relationship between conceptions of teaching, teaching approaches and learning outcomes [Kember, D. (1997). *A reconceptualization of the research into university academics' conceptions of teaching. Learning and Instruction, 7,* p.269].

The path between institutional influence and conceptions is shown as a dotted line to show that it's not clear if and how much the institution can change people's ideas about how to teach. But from figure 1, it is clear that the teacher's conception influences the teaching approach. Each teacher's ideas about teaching are shaped by various factors, such as experiences as a student, their belief about teaching, the culture of the department or institution, the norms of the field, and the way the classroom is set up (Kember, 1997).

Looking from figure 2.1., we can see that there are many factors that influence teaching approach; institutional influence, curriculum design, student presage factor, and teacher's conception about teaching. When among the institutional influence, curriculum design, student presage factor is same, the teacher's conception is worth to pay attention to because it is directly influencing the teaching approach.

2.5 Pedagogy of Science Teaching

Scientific instruction is teaching that reflects science at its best: experimental, rigorous, and evidence-based (Handelsman et al., 2004). While according to the American Association for the Advancement of Science (1990), Science Teaching is based on the fundamental idea that science education should reflect science practice.

There are three key tenets of science teaching: Active learning, assessment, and inclusivity. Active learning refers to activities where students actively participate rather than passively listen to a lecture (e.g., writing, discussing, solving problems, or reflecting). The assessment was conducted during a learning event

(formative) and at the completion of a unit (summative), which aimed to provide information regarding students' progress. While inclusivity means that students from various backgrounds are enrolled in courses, deliberate efforts must be made to create learning environments that minimize biases and encourage the success of all students.

However, the section on science practices in scientific instruction expands on the idea that science courses should embody the spirit of scientific discovery by involving students in scientific procedures. This idea distinguishes scientific teaching from broad pedagogical techniques (e.g., student-centered learning or team-based learning), which do not focus on incorporating scientific reasoning only. By stating that students should investigate the relationship between science and society, participate in experimental design and interpretation, and engage in formal scientific discourse, scientific teaching addresses the dual goals; of educating future scientists and creating scientifically literate citizens (Couch et al., 2015).

According to Haristiani et al. (2017), Scientific teaching can improve students' comprehension and disprove myths. For example, Indonesian people still accepted the eclipse phenomena as myth-based beliefs and practices, but it decreased along with their age and educational level. A good understanding of science educators is important to students' understanding. This study supports the argument that Indonesia is still largely shaped by the educators' Islamic religious beliefs and scientific ideas that they have been exposed to since elementary school. Fauzi (2022) stated, "Low scientific literacy and application-level leads students to

believe in conspiracy theories". Therefore, teaching about the science behind it is important for children.

2.5.1 Approaches to Teaching

According Anthony (1963), "approach is a set of assumptions dealing with the nature of subject matter and the nature of subject matter to be taught, it states a point of view, a philosophy, an article faith-something which one believes but cannot necessarily prove". It is a set of principles/beliefs, set of correlative assumptions, and a general strategy to approach. So, we can conclude that teaching approach is a set of principle or belief about the nature of learning which translated in the teaching and learning process in the classroom.

In general, approaches to teaching could be classified into two categories; teacher-centered learning and student-centered learning.

a) Teacher-centered learning approach.

Teacher-centered is sometimes called teacher-focused, content-focused (Mladenovici et al., 2021), or traditional pedagogical approach (Sultanov, 2022). This term depicts the teaching and learning process where the teacher intends to transmit the subject's content to the student. This approach relied on the behaviorist theory where the changes of students' behavior are caused by external stimuli (Skinner, 1974). In this approach, teachers are in charge of learning; transmit the knowledge to the students, decide the content, and structure the learning tasks. The learning process are through lecturing because teachers are the primary source of information. The center of activities is textbook, so it used the provision of feedback and correct answers, meanwhile students do not collaborate.

The traditional method of teaching has been criticized by some scholars, arguing that it is supporting passive students, while if the main purpose in the classroom is to empower learning, teacher need to ensure that students participate actively in the classroom. It is also argued that teacher centered learning is boring, and research have discovered that it is one of the factors responsible for absenteeism among tertiary education students at the University of Canterbury, New Zealand (Hunter et al., 1999), as well as among students at Nigeria and Barbados (Fayombo et al., 2012). However, some researchers also support the use of teacher-centered learning; they argued that if the teachers are knowledgeable in the content and apply the motivational strategies, student will actively engage in the classroom, maintain their attention thus become academically successful (Espenshade & Radford, 2009).

b) Student-centered learning approach

A student-centered approach is a term that is used when the teacher aims to change students' conceptions of the content. Student-centered learning approach is sometimes called learning-focused, learning-centered (Mladenovici et al., 2021), or progressive learning (Sultanov, 2022).

The active learning approach is commonplace to define student-centered, where the teacher acts as a facilitator rather than a knowledge/information transmitter (*Active Learning*, 2005). In this approach, the students play active role in the learning process, they learn independently, and involved in the activities, materials, and content, where the learning is influenced by the prior knowledge. There are two methods explain the ways to employ this approach; the first is to give

a ten to twenty minutes mini-lecture, then students consolidate their notes, find the gap, and discuss with a classmate, while the second way is to give ten to twenty minutes lecture, then student work with a classmate or small group to recall, clarify, and elaborate on the lecture's content. The center of activity is not dominated by textbook, so their problem-solving and decision-making skill is not limited (Serin, 2018).

An active learning approach in science courses affects the cognitive level of student achievement meaningfully and increases student performance (Aydede & Matyar, 2009; Fayombo, 2012; Aji & Khan, 2019). A lot of research has proven that active learning improves student performance in science compared to traditional teaching (Demirci, 2017; Obniala, 2019, Betti et al., 2022). Giving students responsibility will allow them to act effectively, reflectively, critically, and critically in the classroom. It is also argued that this approach is an effective pedagogy to prepare students with a skill to generate a more democratic society (Dewey, 1997).

The difference between teacher-centered and student-centered learning characteristics can be seen from table from Al-Humaidi (2015) below.

Table 2.1. Comparison of teacher-centered and student-centered characteristic

Teacher-centered learning	Student-centered learning
Teacher-driven	Self-regulated learning
More passivity	More students' participation
More teacher's control	More students' power
Unification of the perceived students' background knowledge	Appreciation to students' diverse background knowledge and skill

Rigid and formal learning routes	Dialogic negotiation of the learning routes with the teacher
Textbook-driven	Encouragement of self-exploration
Test-oriented assessment	Authentic formative and summative assessment
Provision of notes by the teacher	Self-note taking
Spoon-feeding activity	Critical discussion to understand the materials
Less questions and answers	Active questions and answers

2.5.2 Science education in school

Science is the search for truth, and humanistic is a key duty of science to be aware of the issues people encounter (Waddington & Feinstein, 2016). Science is there to solve human problems, for example, the food crisis in a particular area due to limited natural wealth. Science help produce new varieties as a result of food technology, such as having superior plant seeds. However, science in school is depicted as the opposite of humanity, and Dewey has explained how it could happen.

According to Dewey (1997), there are three contemporary problems in science education in the classroom. First is when the teacher is incompetent and focuses on students' memorization, wishing the students to memorize a grab bag of facts and laws, making half-hearted attempts to integrate the disparate bits of information into a coherent story. Know and believe that science is mere school knowledge that is unreal and irrelevant to their lives. The second problem is an excellent subject matter understanding but sees their mission as directly transmitting the structure of the "finished" subject, beginning with core principles

and working outward from there to allow for a grasp of the entire logical system. Shortly, students mirror this knowledge in their minds without doing any practice. The last problem is where the major step in the right direction (active science in authentic form) tends to be banded to the standard curriculum in either its "disconnected facts" or "junior mirroring" form, where the laboratory problems end up being "only problem that occurs to one already initiated in the subject" (Waddington & Feinstein, 2016).

2.5.3 Classroom environment in science teaching

The classroom environment can be understood when it is seen as a system where there is a complex relationship between physical structure, classroom arrangement, the teacher, the students, and the way space is used (Gump, 1987; Rivlin & Rothenberg, 1976), which can influence behavior and educational program (Rivlin & Weinstein, 1984). It consists of physical (modes of layout/classroom setting), and the pedagogic/teaching style (Martin, 2002).

Further, Martin (2002) argues that the classroom environment effects their pedagogy. It could have happened because classroom setting, such as when the room is organized in rows, the teacher's mobility is limited and remain stable at front of the class (single activity), and the reverse effect could be happened too; when the teacher wants to apply the teacher-centered, they will create the row type classrooms. However, Cox (2019) explained that if a teacher chooses the teacher-focused centered approach, thus the desks will be in a row or small clusters facing the front of the classroom, while if the teacher prefers the student-centered approach, then the desks should be put into groups or semicircles so students can

easily elaborate with one another. Regardless of what influence what, the researcher asserts that teachers need to have an awareness of the relationship between a classroom setting and teacher pedagogy.

According to Malik & Risvi (2018), classroom environment is one factor affecting students' achievement. They argued that if the low achievers involve actively in the classroom, their learning might affect more positively. A well-structured classroom management can improve the learning and behavior. Classroom management refers to all the things that a teacher does to organize students, space, time, and material so that student learning can take place (Wong et.al, 2012). Chandra (2015) stated that when it comes to classroom management, there are some considerations that the teacher should know, such as; the teacher needs to pay attention to the whole class, teacher cannot talk over what the students are saying and overcome the situation by being silence (can be useful at times), the teacher should move around the room and give nonverbal clues so that students are more likely to pay attention, and teacher should plan the lessons so that the time is filled with things that help students learn. In a nutshell, both the classroom setting and pedagogy skills are needed by teachers to support the improvement of students' achievement.

In 2016, Yeliz found that science teachers agreed that there are three dimensions of classroom management skills, they are people management, behavior management, and instructional management. People management related to what teachers believe about students as person and what teachers do to develop the teacher-student relationship, while instructional management such as structuring

daily routines, allocating materials, and monitoring seatwork. Ideally, seating arrangement in science classroom should promote collaboration, comfort, and movement to work in two scenarios; independently and collaboratively (Sadler, 2021). As for the meaning of behavior management is strategies and systems that will manage and eliminate difficult behaviors that prevent students from succeeding in an academic environment (Webster, 2020).

However, a student-monitored classroom management system is a great deal to considered too, especially for the physical science classroom. A student-monitored classroom has been field tested for its significance to increase student on-task time and reduced disruptive classroom behavior, while for teachers, it helps them to gain more time to devote teaching science content and designing learning activities, and regaining science teaching enthusiasm (Sorensen & Roueche, 1986).

2.5.4 Science Teaching in Islamic Pedagogy

Science teaching has been discussed by Muslim scholars; Khaldun (1967) asserts that the level of remembering is low compared to analyzing and creating. Thus, ideally in teaching science, the teacher should not rely on rote learning. Another Muslim scholar, Al-Jahiz emphasized that the past's independent thinkers and researchers disliked memorization. Because when we rely on it, "our minds disregard distinction" and avoid thinking. People with excellent memories are likely to rely on the accomplishments of their predecessors without attempting to conclude. In addition, he also argues that a strong memory is necessary and

beneficial for the study process. Otherwise, any study's results would be lost, and the fruits of research would not endure. (Gunther, 2009).

The neglection of thinking, or even anti-intellectualism, will produce the ummah that must accept the backwardness and slump of fate. Ummah will continue to be left behind and marginalized from the stage of world history. Ummah becomes a consumer of other people's intellectual and technological products. These are all the most logical consequences that must be accepted. While if the ummah wants to be a victorious nation, there is no way for the ummah except to return to the above criticism of the Qur'an: to be a people who think critically, productively, openly, use the grace of reason to believe and think about God's creation, reflect, explore and manage it for the welfare of humankind (Sahin, 2018).

In Indonesia, literatures depict Islamic education as a narrow concept, it equates Islamic Education as merely Islamic Religious Education (Amri et al.,2019; Kasmar et al., 2019 Siregar,2021. While, Islamic Religious Education is the standard name for teaching about Islam. Islamic religious education is what they do or try to do to teach people about Islam. Thus, it is a subject because it teaches about Islam, and we cannot equate Islamic Religious Education with Islamic education because Islamic Religious Education is one part of Islamic Education (Amiruddin et al.,2021). Sahin (2018) also stated that Islamic education is depicted as merely 'Muslim Education,' 'Islamic Pedagogy,' 'Islamic Nurture,' and 'Islamic Religious Pedagogy'; even some say that Islamic Education is Islamic Studies. But when checking the Qur'anic linguistic word of Tarbiyah and several misinterpreted instructions in Muslim Teaching, Qur'anic verses are supported humans in

developing their scientific reasoning. Tarbiyah in Arabic from Islamic literature is the concept of "human flourishing," It was identified as critical to the formation of a critical, reflective Muslim, which was itself essential to a modern conception of Islamic education. Further, he argues that the crisis Muslims face nowadays is due to the unclear concept of Islamic education. Islamic education is supposed to be a big system/concept, not limited to a small concept, and it is supposed to develop another aspect emphasized in the Qur'an; the reasoning/critical thinking aspect.

Islamic pedagogy is described by the word of Tarbiyah (Sahin, 2017). The central idea of Tarbiyah is to promote growth by caring for, nurturing, and directing those who are to receive an education. Tarbiyah strongly implies the presence of moral principles to ensure a balance and respect between the educator's authority and the learner's autonomy, just like in any genuine educational process, as opposed to indoctrination or mere training. Tarbiyah emphasize to think critically or reasoning, productively, and openly, use the grace of reason to believe and think about God’s creation, reflect, explore, and manage it for the welfare (Sahin, 2018). Instead of forcing information in, the Arabic word Tarbiyah (education) refers to the process of facilitating and leading thoughts out based on rational argument and ethical principles. Education therefore refers to a learner-led transformative process of care, guidance and growth into human maturity (Sahin, 2021). To be clear, table 2.2 show the similarities of characteristics between student-centered learning from Humaidi (2015) with Islamic pedagogy from Sahin (2017, 2018, 2021)

Table.2.2. An overview on the similarity between Student-Centered Learning with Islamic pedagogy

Student-centered learning	Islamic pedagogy
Self-regulated learning	Productively and openly.
More students' participation	Guidance, facilitating and leading thoughts out.
More students' power	Caring for, nurturing, and directing those who are to receive an education
Appreciation to students' diverse background knowledge and skill	Moral principles
Dialogic negotiation of the learning routes with the teacher	A balance and respect between the educator's authority and the learner's autonomy
Encouragement of self-exploration	Explore
Self-note taking	Reflect
Critical discussion to understand the materials	Think critically or reasoning
Active questions and answers	Facilitating and leading thoughts out.

From table above, there are no contradict concept of education between Islam and the established western literature about student-centered learning. Therefore, Muslims need to pay attention and be more open-minded, thus practice the educational attitudes according to the Qur'an and the prophetic traditions that have motivated the first Muslims (in the medieval era). When Muslims adopt an educational curiosity about the diversity of cultures associated with them according to this, the stereotyping between Islamic and western pedagogy will no longer exist (Sahin, 2018).

Student-centered learning approach is sometimes called learning-focused, learning-centered (Mladenovici et al., 2021), or progressive learning (Sultanov, 2022). In Islamic pedagogy, there were three themes of transformative pedagogies. First, warm (caring human) relationships are at the heart of relational pedagogies emphasizing learning and growth. In this term, it requires differentiated teaching

and learning, as well as pedagogical strategies that support relationships of positive valence with and between educators and learners. Second, collaboration means speaking in conversation, acting in social practices, and asking and answering questions together. The last theme is pedagogies of conscious awareness, which aims to increase awareness of Islam as a conceptual system. Mediation and reflexivity are two pedagogies of conscious awareness (Alkouatli, 2018).

Islam did not impede progress and was a major driving force. The portrayal of Islam as a "science-friendly" religion was a notable feature of this attitude (Sahin, 2019), supported by allusions to the Middle Ages' accomplishments of Muslim scholars such as Ibn Sina in medical, Al-Khawarizm in Mathematics, and Jabir ibn Hayyan, the foremost father of chemistry, and also known as *al-Sufi* (Amr & Tbakhi, 2007). Therefore, the researcher argues that if science teachers separate science as memorized lessons only without connecting with real life, there must be a misunderstanding in implementing Islamic teaching because the misrepresentation of Islamic teaching has long spread, and "even the friends of Islam often unwittingly fall into these falsities." (Yalcinkaya, 2011).

a) Worldwide Muslim history (regarding science education)

In the medieval era, scientific instruction was extensively demanded and cultivated in the East. It is believed that the rational souls (of the people of the East) are by nature more perfect than those of the Maghribis (western area of Arab). But Khaldun (1967) explains that it's not because Bedouins (a nomadic tribe in the Arabian Peninsula) are inferior to those sedentary people. But more because the

sedentary people have many crafts, good habits, and suitable teaching methods. The Eastern populace becomes more intelligent due to their souls being influenced by scientific activity. Bedouins with understanding, intellectual perfection, and natural qualifications can also reach the highest rank once they can master the same habit/tradition of scientific attitude.

However, colonialism affects a unique relationship, which creates new perspectives between Muslims and their place in the modern world. While this was happening, new disciplines like orientalism and comparative religion-all of which were products of the nineteenth century-produced a wealth of knowledge about these religions and covered various aspects of old arguments. In 1887, the Curriculum Reform Commission in Turkey recommended more classes on Islam after finding that students' interest in Western ideas caused disloyalty to the throne, immorality, and ignorance of Islamic matters (Yalcinkaya, 2011).

Nevertheless, religious-based schools are believed to be unimportant to students' professional prospects (Barnes, 2014, p.13), while in public schools, they are believed to be more advanced in science academics (Saefullah, 2019). Muslim ummah nowadays divides Islamic education into two types: secular education, when the dominant activities are acquiring knowledge of mathematics, science, and history (formal subjects) but are far away from the *Deen* (religion), while the other hand, *Madrasas* teach about Qur'an, Hadith, *Shari'ah*, and Fiqh (Islamic subject), but they are unaware of mathematics, science, history, and geography (Naik, 2021). We want a balance between *deen* and formal knowledge because those subjects are part of Islam and thus should be included in Islamic education. According to Islam,

we need to implement systems that support this inclusiveness, such as the concept of reasoning/critical thinking (Sahin, 2018).

b) History of Dual System Education in Indonesia

As a result of negative treatment from colonial government, Islamic education was marginalized, which had a tacky and orthodox connotation. In addition, the content of education was oriented towards the practice of religious rituals, paying little attention to science and technology (Tilaar, 2000). Indonesia as one of the largest Muslim countries is also impacted, now Indonesia holds a dual education system where generally is divided into two; under ministry of Education and under ministry of religious affair. By this division, religious-unaffiliated school are more desirable to study advance about science and technology.

On decades, in the relationship between religion and science, a distinction has been made between the terms "Islamic studies" and "non-Islamic studies" in the scientific history of Muslims. This distinction even becomes a type of dichotomy, particularly in the field of the Indonesian education system. There is a difference between the characteristics of religious schools (supervised by the Ministry of Religious Affairs) and public schools (under the Ministry of Education and Culture). This dual system of education is a product of the New Order Government, which did not recognize religious schools as part of the formal education system. However, this recorded historical just formality because, before the New Order Government, the dual system was already there unofficially (Zuhdi, 2016).

CHAPTER III

RESEARCH METHODOLOGY

3.1 Introduction

I divide this chapter into three parts. In the first part, the researcher discusses the justification of the research approach used in achieving the goals, includes the research design specifically. In the second part, the researcher discusses the data collection procedures, which include observation, interviews, and document analysis. In the third part, the researcher discusses the context of the research which includes reasons for choosing the place, participants, and time. In the fourth part, the researcher explains the procedure for data analysis, which is then followed by research ethics and trustworthiness. Each section is discussed sequentially in the following paragraphs.

3.2 Research Approach and Research Design

In this study, the researcher used a qualitative method. Qualitative research is applied in this research because its aim was to investigate a problem to obtain a better understanding of certain phenomena (Creswell, 2011). The conception of science teaching in the Islamic context is complex, it cannot be measured. This research aims to understand better holistic science education in an advanced Islamic

senior high school in Sumatera. Thus, the use of qualitative approach will uncover the answer holistically.

This study used a qualitative research method using a case study, as this approach deeply studies specific activities, programs, people, or groups (Creswell & Creswell, 2018). A case study researcher defines a case as a bounded system; it should not be surprising that they study how the system operates, which resulting a description, to understand how the parts operate together. In this particular study, the boundaries were defined as follows: firstly, it conducted in Riau, Indonesia. Secondly, it involved state Islamic high school, not a private one, and thirdly, the participants are limited to the teachers who are teaching science. By these setting of boundaries, it is expected that this case study will examine the contexts of the case to describe and explain better the functioning of the case (Johnson & Christensen, 2016).

There are three types of case studies: exploratory case studies, descriptive case studies, and explanatory case studies. A descriptive design attempts to provide a complete description of a phenomenon within its context (Hancock & Algozzine, 2006). Therefore, a descriptive case study design used in this research.

The research procedure used in this study is refer to Creswell six stages (Creswell, 2011). The first stage is identifying the research problem, the second is reviewing the literature, the third stage is specifying a research purpose, the fourth stage is collecting data, the fifth stage is analyzing and interpreting the data, and the sixth stage is reporting and evaluating the research. The research process carried out by the researcher was to arrange a research proposal and at the same time

attempt to obtain permission on the research site. The next step was data collection, data processing or data analysis, reporting and conclusion. This process carried out to obtain search results objectively

3.3 Method of Data Collection

This research aims to explore how the science teacher's approach in teaching science with Islamic values in Islamic senior high schools. The selection of the participants was because they are the teachers in science subjects and currently employed in an Islamic senior high school. To have a validity of this study, the data was collected and analyzed; interview (using open-ended questions), observation, and document analysis. As a qualitative study, data in this study was obtained by triangulation through primary and secondary resources. The primary resource consists of interview to teachers and students, and classroom observation, while the secondary resource is document analysis. In detail, the researcher conduct documents analysis and students interviews to confirm the result of teachers interview about learning process.

3.3.1 Interview

There are three types of interviews; they are structured, semi-structured, and unstructured. Most of the time, the interview type fits the research process stage. Structured interviews are often the best way to go if a project is trying to answer a question that has already been well-researched. However, semi-structured and unstructured interviews may be better in new areas of research where there is not much research or it's old (Wethington & McDarby, 2015).

When the study focuses more on the characteristics of a case or person than on comparing the responses of large groups of people to the same questions, unstructured interviews are employed (Wethington & McDarby, 2015). An unstructured interview resembles a conversation more than an interview and is always considered a "managed dialogue" that favors the interviewer's interests (Jamshed, 2014). Unstructured interviews aim to collect in-depth information and typically do not include predetermined questions (Gray, 2021). In this research, the interview involves many participants since the teaching and learning process involves teachers and students.

In this study, the researcher conducted on site interview to the school site and contacted two teachers on each subject Biology, Chemistry, and Physic respectively. The researcher chose the semi-structured interview to lead the researcher keep focusing on the research question but still able to gain more information and the researcher also employed an unstructured interview process to confirm the observation and answers from a semi-structured in this research. In detail, these teachers were being informants to see their perspective on science and science education relating with religion. In addition, the researcher also conducted unstructured interview with students to clarify things and to provide additional data from the teacher’s interview data. The researcher chose students grade XI because class XII has finished their studies (they had back to their hometown and waiting for farewell), while students in class X are too new to be interviewed as the most experienced with the class learning and school environment. However, all the

interview processes in collecting data were conducted in Bahasa; thus, the result was translated into English.

3.3.2 Observation

One qualitative research collecting data method is observation, which consists of participant observation and field research work. When conducting research using an observational design, multiple study locations are utilized. According to Creswell (2011), observation collects open-ended and first-hand information by observing individuals and places at the research site. Observational data can be incorporated as either additional or confirmatory research (Jamshed, 2014). However, in this research the observation was limited to classroom atmosphere because the learning process observation was not feasible to be observed (i.e., student-teacher interaction and student-student interaction) due to examination week. In detail, the researcher observed how the table arranged in the classroom to see its support to student-centered learning, do they use whiteboard or technology-based (to see the support of facility to learning process), and wall decoration which containing science or religion.

3.3.3 Document analysis

A case study uses evidence from many different places, and the data needs to come together in a way called "triangulation" (Yin, 2018). Therefore, the researcher had a document analysis for additional information from this school to fulfil the triangulation, such as regulation documents from government, school official website and school documents; such as vision and mission (*see* *appendix 5*), lesson

plans (see appendix 6), lesson timetable (see appendix 4), and students' worksheet (see appendix 7).

Four from six teachers' lesson plans and one student worksheet were collected due to time limit. The congruence between the content of collected documents with school's vision and mission would be a checklist to prove that teachers' approaches in science subjects are implemented according to the curriculum.

3.4 R*esearch Subject, the Place, and the Time of the Research*

The subject in this research is members of one of *Madrasah Aliyah Negeri* (MAN), a public Islamic secondary school that emphasize science and technology in its teaching. The effort to encourage sciences and technology can be seen in the vision and mission of this school's official website. The time taken for this research took about on May 2023, with duration of approximately one week due to time limit and school situation (i.e., students are busy with exam, teachers are busy with meeting for farewell preparation).

In exploring the answer of this study, ten participants were recruited to be interviewed for this study. Teachers were selected as representative teacher in each science subjects teaching. In Indonesia, specifically in junior high school, science subject was referring to subject which studying all things that related with nature. Science subject term is also usually used to classify major in senior higher school. This classification is also a differentiation between science class with social science class, where in science class Biology, Chemistry, and Physics are more dominating and emphasized. Therefore, the researcher used "science subject" term following

this context. The researcher also selected students randomly as a representative from each science class. The summary of participants identity can be seen in following table.

Table 3.1. An overview of the research participants and their biographic information

No	Name (pseudonym)	Status	Gender	Age (years)	Mayor	Teaching experience	Education Background
1	Arya	Teacher& Olympiad teacher	Male	25	Chemistry	2 years (H)	State university
2	Atia	Teacher	Female	31	Chemistry	8 years (D)	State university
3	Evelyn	Teacher	Female	36	Biology	6 years (H)	State university (D)
4	Vivian	Teacher& Olympiad teacher	Female	31	Biology	10 years (D)	State university
5	Trinity	Teacher& Olympiad teacher	Female	29	Physics	8 years (D)	State university
6	Aldi	Teacher	Male	30	Physics	12 years (H)	State university
7	Jaka	Student	Male	16	Science 2	-	H
8	Aila	Student	Female	16	Science 1	-	H
9	Diana	Student	Female	16	Science 2	-	D
10	Darren	Student	Male	16	Science 1	-	H

Note: D=different type of school experience, H=homogenous school experience

The researcher seeks to answer how is this Islamic-based school encourage science learning and even more curious about it despite some assumptions about the religious barrier. At a glance visitation to the school's official website, this school have achieved many national achievements. This is a good sign that this school is applying its vision; to create high quality human resources in the mastery of science and technology and faith and piety.

3.5 Data Analysis

The collection and analysis process enabled the researcher to check the sufficient and appropriate information that been gathered. The researcher produced a "verbatim transcript" of the interview using the recording of the interview because it helped the researcher to concentrate on the content of the interview (Jamshed, 2014). The researcher also did not forget to confirm and match the result of all the obtained data to the participants before it being processed. This strategy is known as member checking (Creswell & Cresswell, 2018). In detail, the member checking process was conducted after every time each answer item was obtained, so it was different than giving a full paper of interview transcript results to the participant after the interview finished.

The obtained data was then categorized, interpreted and compared. The researcher used a computer-assisted tools because it can help as an able assistant and reliable tool to code and categorize amount of data (Yin, 2018). The software that the researcher used named Quirkos, because it is a simple qualitative analysis software that help the researcher to understand the data quickly and easily (Quirkos.com). The researcher performed coding procedures to figure out similar themes across the data based on the research questions, in this process, some categories merged into larger categories based on the similarity. Finally, the researcher selected the core categories and validated the relationship between them. In addition, the researcher aligned these categories with the data from several documents. The process of analyzing the data examined through the lens of the theory underlying this research teaching approach. As the result, an in-dept

understanding of the central phenomenon can be formed through description and thematic development.

3.6 Trustworthiness

A qualitative research process deriving meaning from words and observations. Therefore, to be relevant, research must be trustworthy. Trustworthiness in qualitative research is established by four things; credible, transferable, confirmable, and dependable (Moran, 2016). Credibility is the level of confidence of the research study's finding, which can be obtained using triangulation. Transferability is the applicable of the finding to other context, circumstances, and situations. Confirmability is the degree of neutrality of the research study's finding, which is means that it is not bias, the researcher does not skew the interpretation to fit a certain narrative. Lastly, dependability, is the extend that the study could be repeated and the finding would be consistent. To enhance trustworthiness of the data interpretation process, the researcher conducted data triangulations and member-checks. The researcher incorporated multiple sources of data to support each finding of the study such as interview, observations, and document analysis. Before the researcher analyzed these data, the researcher also made sure the participants to validate the conclusion of each interview result. This process is important to have an accuracy of the report if the interpretations are fair and representative (Candela, 2019). Thus, all data obtained were valid to be processed.

3.7 Confidentiality and anonymity

This research has throughout the consent of the school by the letter of research permit (*see appendix 10*). To protect the privacy of the school, the school's name remains secret as well as all website references that direct to the school identity were omitted. Moreover, the school member permission of research recording during the interview were also obtained. The pseudonym of all participants was also done in synthesizing this thesis (*see table 3.1*).

CHAPTER IV

RESEARCH RESULTS & DISCUSSIONS

4.1 Introduction

The main objective of this study is to explore how the science teacher's approach in teaching science, specifically in Biology, Chemistry, and Physics subjects in Islamic Senior High school in Riau which is well known as an Islamic school that has a vision to advance science as an Islamic institution.

In this chapter, three research questions are considered relevant to achieve this objective: 1) How do Islamic senior high school teachers perceive science in relation to religion? 2) How do teachers implement their teaching approach in teaching science in the classroom? and 3) How do science learning resources in Islamic senior high school be chosen? Findings on these questions are reported and also includes discussion consecutively in the following:

4.2 Research Question #1 How do Islamic senior high school teachers perceive science in relation to religion?

Teacher perception of teaching influence on their teaching approach (s, 1997); the Teacher-centered approach was used by teachers who wanted to pass on information, while the student-centered approach was used by teachers who wanted

their students' ideas to develop or change. In this context, the researcher firstly seeks to find teacher's perception in relation to religion.

Relationship between science and religion

Each of teacher has their own perception of science and religion relationship. The answer toward the researcher's question is possibly ranging from whether it is supporting, contradicted, or live in separated area. The term of science and religion is not contradicted is also could have two interpretations; either the religion support science, science support religion, or maybe both.

In that case, the researcher sees that one of chemistry teacher named Mr. Arya (pseudonym) see these two relations, which are that religion support science by stating that "so many sciences in the Qur'an that is proven true by scientists today", and that science support religion by stating "when students learn about science, their faith in Allah is increased." He stated:

> "As for my personal opinion, I feel that science in Islam is one of the interrelated things, complementary, not separated. It seems that so far, I haven't seen anything that contradict, so basically, if I see things like the theories contradicting each other, that's normal, because every scientist must have their own perspective."
>
> (Mr. Arya, 19/05/23)

The researcher tried to gasp more information about his statement, on which part he saw science and religion interrelated, so after the researcher re-read the excerpt, the researcher understands from his explanation which saying that all

science comes from religion. Further he convinced that many scientists and experts in long time ago was also religious, so there must be no contradiction between science and religion.

The similar finding with Mr. Arya opinion was also found in physic teacher answer:

> "The science that has been studied so far does not contradict the Al-Qur'an and Hadith. Science and Religion can be complementary partners, religion can support all scientific activities, and science can improve religious understanding for the welfare of mankind."
>
> (Mr. Aldi, 23/05/23)

Another Physics and Biology teachers are also having the same thought that science is not contradict with religion. The understanding of the relationship between science and religion is believed to impact on students' faith:

> "The students' interest and motivation for Physics subject changes, where at first they only thought that it was only science *duniyawi*, but when you talk about the relationship between science and religion, it strengthens the faith"
>
> (Mrs. Trinity, 19/05/23)
>
> "Science is very supportive of religion, even after studying science, students become more and more convinced of their religion."
>
> (Mrs. Evelyn, 19/05/23)

> "So far, because I'm a biology teacher, there are many things that are in religion and in Biology coincides. In Biology, the knowledge is actually strengthened.
>
> (Mrs. Vivian, 19/05/23)

Interestingly, Mrs. Vivian further stating that evolution theory has not end its contradiction with religion. The researcher think that Mrs. Vivian might assumes that she sees a contradictive content between science and religion in certain part, such as evolution theory. But in her further clarification, she did mention that this contradiction was not come from Darwin's statement, she said that "Darwin does not even say about the descended of human being from an ape". In responding to this data, the researcher checked the book source that this school used to see whether Mrs. Vivian statements were an effort to mediate content between science and religion in certain part, such as evolution theory, or to minimize conflict in the classroom, because many classrooms faced this situation (Silva & Mortimer, 2020); was it according to the official resource? Thus, the researcher conducted a content checking in that book. The researcher could not find a change of an ape to human being as one of examples in evolution theory, but this book does mention that "until now, the problem of evolution is still a mystery that will continue to be uncovered, studied, and verified" (*see appendix 8*).

Mrs. Vivian also added that Darwin's theory that has been introduced in schools is different with what Darwin has introduced, which is basically theorizing about changes which takes a long period. Reacting to this, researchers browsed the government's official website to check whether the official government has any

certain document related to this problem. The researcher thus visited government preservation website, and from this website the researcher found the statement which mention that the relation between human and ape is not like grandson and grandfather, but more to share a common ancestor (*see appendix 9*).

The researcher also found a unique answer when the researcher asked about whether science and religion are related or not to Atia, the senior chemistry teacher:

> "You could say it's related, but it could be different, depending on where the position is and what it's for."
>
> (Mrs. Atia, 22/05/23)

When the researcher posted further question to gasp what does she meant by word "different", Mrs. Atia explained that what she meant by that was referring to whether it is useful or not; if the discovery is useful, so it is support/align with the religion, whereas if it is not (somewhat dangerous), although the context depends on each person's personality, so it is not supporting the religion:

> "If for example on things that are useful, it can be said to support each other, such as useful discoveries in the world of education. But for things that are somewhat dangerous, although the context depends on each person's personality, how are they used and applied? In chemistry, for example, nuclear technology, which is currently being used inappropriately by some elements..... So that it can be said that if there is a conflict, then it is caused by the person alone. If we use it according to the path, which is automatically according to religion, it will definitely support it."
>
> (Mrs. Atia, 22/05/23)

In another word, Mrs. Atia see the relation between science and religion, specifically that religion support science.

In summary, all of those teachers that the researcher interviewed are in one vote to agree that science and religion is interconnected; science supporting religion belief, and religion support science, or both.

The teachers' practice in connecting religion into science teaching

The teachers in this school also emphasize that it is important to connect religion into the science teaching; there must be an integration between them even though the researcher found that teacher's motives on connecting religion with science are varied; to increase student motivation, moral needs, and curriculum demand.

In the national curriculum; curriculum 2013, which is currently use by this school, demanding spiritual aspect as one of four core competencies that must be achieved (MoEC, n.d.). This finding was found from Mrs. Atia and Mrs. Trinity explanation:

> "To connect is important because there should be an aspect of spirituality included in education (Core Competency 1)"
>
> (Mrs. Atia, 22/05/23)

> "In those modules, I have seen that they are directed to integrate science with religion and the Qur'an. So, it depends on the teachers to explore it themselves or simply use the module provided in the MGMP (subject teacher's forum)"
>
> (Mrs. Trinity, 19/05/23)

It is interesting to the researcher when Trinity reluctant to directly telling how she was connecting science with religion in the classroom when the researcher asked about it. But when she used the word "and" to link religion with the Qur'an, the researcher got clue that she differentiates between Qur'an as a collection of verses and religion itself, it could be means that she assumes Qur'an as a part or as a separate unit from religion which the researcher did not ask further. This clue is meaningful to the researcher because it implies that connecting science with religion does not necessarily use Qur'anic verses.

However, the result of student interviews said that not all teachers had linked religion with their science learning in the classroom. They argued that only Mr. Arya, Mrs. Evelyn, and Mrs. Trinity who connected religion with their science learning, because Mr. Arya and Mrs. Evelyn mentioned certain verses or hadiths related to their certain topics, while Mrs. Trinity connects it with the greatness of God, and they were not sure whether other teachers had linked science learning with religion.

> "Right at the formation of the ovum in the uterus material, Mrs. Evelyn relates it to the hadith, specifically in conclusion of the hadith"
>
> (Jaka, science 2, 24/05/23)

> "There is a moment when Mr. Arya connects Chemistry with religion, for example the social life that is applied to everyday like H_2O or water, he associated it with a certain verse of the Qur'an"
>
> (Darren, science 1, 24/05/23)

> "Mrs. Evelyn connects Biology subject with religion, not only with religion, but also with Health. Like when she says *it's the same as what has been recommended by the prophet*…. There was also a moment when we were discussing reproduction, about how mothers give birth; she advised *don't be disobedient*, then she read the verse."
>
> (Aila, science 1, 24/05/23)

> "Mrs. Trinity also connects the subject with religion. For example, when we were discussing gravity, Mrs. Trinity said, "God has created it in as much detail as possible,"
>
> (Diana, science 2, 24/05/23)

Despite which type is correct or wrong about how to connect science with religion, all teachers have come to agreement that religion taught us to pursue science education. It is just, how teachers in this school educate science to students were different (will be discussed in next sub section).

In this study, the researcher also tried to draw a connection between teacher's perception to their teaching approach. The finding of this study leads the researcher to various results. The discussion will be continued in the following sub section.

4.3 Research Question #2 How do teachers implement their teaching approach in teaching science in the classroom?

First, the researcher describes the characteristic of student-centered learning approach followed by a description school's curriculum, then the researcher reports

the role of the teacher in the classroom as documented in the interviews data, observation of classroom environment, and lesson plan (*see appendix 6.*).

An overview of The School Curriculum

According to their official website, this school is applying curriculum 2013 which has modified in accordance to school's vision, mission, goals and target of madrasah. Table below show checklist of fulfilled item in curriculum 2013 by school vision and mission.

Table 4.1. National curriculum comparison with school vision and mission checklist

School's vision and mission (Adopted from *appendix 5)*	Curriculum fulfilled (Adopted from *appendix 3*)
Realizing education that produces graduates who excel in quality.	✓ Learner-centered learning ✓ Mass-classical-based learning ✓ Self and group learning (team based)
Realizing a healthy competitive spirit for all citizens to excel	✓ Interactive learning patterns ✓ Mass-classical-based learning patterns ✓ Self and group learning (team based)
Realizing active, innovative, creative, effective, and fun learning so that students develop optimally	✓ Learner-centered learning ✓ Learning patterns through networks ✓ Self and group learning (team based) ✓ Mass-classical-based learning ✓ Multimedia-based learning
Realizing learning with a scientific and contextual approach	✓ Active-seeking learning (inquiry/discovery learning) ✓ Mass-classical-based learning patterns ✓ Self and group learning (team based)
Realizing learning with discovery learning method, problem-based learning (PBL) and project-based learning (PJBL)	✓ Learner-centered learning ✓ Self and group learning (team based) ✓ Critical learning patterns ✓ Learning patterns through networks ✓ Mass-classical-based learning patterns ✓ Multimedia-based learning

School's vision and mission (Adopted from *appendix 5)*	Curriculum fulfilled (Adopted from *appendix 3*)
Creating adequate facilities and infrastructure for the implementation of learning effective and fun.	✓ Multimedia-based learning ✓ Self and group learning (team based)
Creating an authentic assessment	✓ Multidiscipline learning (multiple sciences) ✓ Mass-classical-based learning patterns ✓ Self and group learning (team based)
Realizing extracurricular activities that involve competence development and preservation of local culture to foster students' potential self-development.	✓ Critical learning patterns ✓ Multidiscipline learning (multiple sciences) ✓ Learning patterns through networks ✓ Self and group learning (team based)
Realizing honest behavior, discipline, caring, curiosity, politeness, responsibility, self-confidence, tolerance, internal motivation, healthy lifestyle, environmentally friendly in interacting effectively with the social environment and the range of association and existence	✓ Multidiscipline learning (multiple sciences) ✓ Critical learning patterns ✓ Learning patterns through networks ✓ Self and group learning (team based) ✓ Learner-centered learning
Realizing students to recognize their potential so that it can be developed optimally.	✓ Learner-centered learning, learning (multiple sciences) ✓ Learning patterns through networks ✓ Self and group learning (team based) ✓ Critical learning patterns
Realizing appreciation of the religious teachings adhered to so that they become a source of wisdom in acting	✓ Multidiscipline learning (multiple sciences) ✓ Learning patterns through networks

As a madrasah that has excellence in the academic field, the curriculum structure of this school refers to the Decree of the Minister of Religious Affairs Number 184 of 2019 concerning Guidelines for the Implementation of the Madrasah Curriculum.

In that decree, it is also mentioned that madrasah must be able to prepare the competence of students in the millennial era to be able to carry out 21st century learning, namely 4 C (Critical thinking, Creativity, Communication and

Collaboration). In this school, curriculum development and learning are carried out based on the principles “Applying the 21st century learning model;4C”. The researcher thus checked in the school document to know whether they put these four aspects into their lesson plan. The result is shown in table 5.2.

Table 5.2. The comparison between curriculum competence with teachers' lesson plan

Competence	Mrs. Evelyn's	Mrs. Atia's	Mrs. Trinity's	Mr. Aldo's
Critical thinking	Students are given cases related to the material explained by the teacher and asked to do problem solving / technology to overcome a case of a disease that attacks the respiratory system	Teacher provides chance to identify as many things as possible that are not understood, ranging from factual questions to hypothetical questions related to the ***P-T Diagram material***	Learners are given the opportunity to propose hypotheses regarding how force and arm force affect the amount of torque	Teacher provides opportunities to identify things as many as possible that are not yet understood. Starting from factual questions to hypothetical questions related to the material of electric current and its measurement.
Creativity	Create lesson summaries/conclusions	Teachers and students make conclusions about things that have been learned related to the ***P-T Diagram.*** Students are then given the opportunity to ask back things that have not been understood	Students make Mind mapping Torque which contains important things that have been learned	Teacher and students make conclusions about things that have been learned related to electric and its measurement. Learners are then given the opportunity to ask questions about things that have not been understood
Communication	Randomly choose one of the students to present the results in front of the class while the other students responded to the presentation of the students who appeared	Students present the results of group or individual work classically, express opinions on the presentations made and then responded back by the group or individual who presented	Students present the results of group work and give opinions to each other on the presentations made then responded back by the presenting group	Learners present the results of group or individual work classically, express an opinion on the presentation and then respond back to the group or individual presenting groups or individuals who presenting

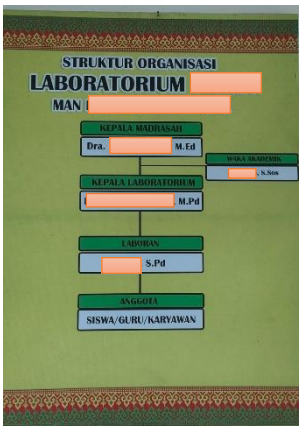
Competence	**Mrs. Evelyn's**	**Mrs. Atia's**	**Mrs. Trinity's**	**Mr. Aldo's**
Collaboration	After finishing solving the problem of the case, students conduct discussions with their friends as well as guided by the teacher to direct the results according to the concept.	Students are formed in several groups to discuss, collect information, represent, and exchange information about ***the P-T Diagram***	Learners are organized to study in small groups to do practicum on the Effect of Force and Arm Force on Torque using student worksheet.	Learners are formed into groups to discuss, gather information, re-present and exchange information about Electric and its measurement.

Science teachers approach to teaching

The congruence between the content of collected documents with the curriculum will be a checklist to prove that teachers' approaches in science subjects are implemented according to the school's vision and mission (see *table 4.1*). However, the researcher still needs to investigate the teacher's approach to teaching, specifically science teachers. The researcher discovered the answer by analyzing school's documents such as teachers' lesson plans, student worksheet, an observation to the classroom environment (see *table 4.3.*) students' project, and students' interviews. Table 4.4. shows the researcher's finding about teachers' approach to teaching science in the classroom according to Sahin's (2017, 2018, 2021) and Humaidi (2015) characteristic of student-centered learning.

Table 4.3. Result of room observation

<table>
<tr><th>Biology Classroom</th><th>Chemistry Classroom</th><th>Physics Classroom</th></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="3">Science subject's classroom are equipped with smart classroom. The chair has also designed to support for self and group learning, but in Biology and Chemistry classroom it is not seem because the pictures were taken in the examination week, that is why the chairs have moved to the wall, normally these classes look like physics classroom. This school is applying a moving classroom system each time they have a different subject time. Each science subjects have its own laboratory and smart classroom; it has distributed for each subject teacher to take responsibility.</td></tr>
<tr><td>   
Biology classroom is equipped with wall decoration such as leaf preservation and creature's structure.</td><td>  
Chemistry classroom is equipped with wall decoration such as periodic table and some Islamic wall decoration.</td><td>  
Physic classroom is equipped with Physics formula and some Islamic wall decoration.</td></tr>
</table>



In general, all laboratories room has organization structure and lab rules and regulation.

The biology laboratory has equipped with many specimen preservation examples.

The chemistry laboratory room has chemical wall accessories.

The physics decoration accessories in the laboratory room were put it at the wall magazine.

Biology, Chemistry, and Physics laboratory room has adequate tools and equipment for experiment.

Biology's student project (create DNA molecule) was displayed in the classroom.

Biology's student project (water cycle) was displayed in the laboratory

<table>
<tr><td>Biology Classroom</td><td>Chemistry Classroom</td><td>Physics Classroom</td></tr>
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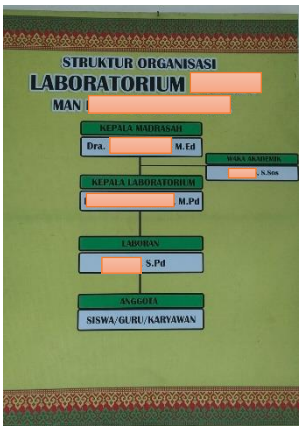
<tr><td>   </td><td colspan="2">In general, all laboratories room has organization structure and lab rules and regulation.</td></tr>
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</table>

		
The biology laboratory has equipped with many specimen preservation examples.	The chemistry laboratory room has chemical wall accessories.	The physics decoration accessories in the laboratory room were put it at the wall magazine.

Table 4.4. Science teachers' approach to teaching

No	Subjects	Teacher name	Class-room	Lesson plan	Students' project	Result findings (students' statement) Aila	Diana	Darren	Jaka
1	Che-mistry	Arya		-	Doing experiment	Unification of the perceived students' background knowledge "When it comes to calculation, he taught the steps, without write them down, he just conveyed them." "Feels like we have to understand that, so feel a little pressure"	Unification of the perceived students' background knowledge "He emphasizes how to make us understand"	○ Teacher-driven ○ Textbook-driven ○ Rigid and formal learning routes "We never had presentation"	More passivity "He used to explain the material" Rigid and formal learning routes "Lack of interaction" Test-oriented assessment "More to exercise, rarely explains how to solve" Active questions and answers "There was once we play chemistry monopoly though"
2		Atia	In Labor	Accom-plished 4C	Doing experiment	Appreciation to students' diverse "Feels softer than Mr. Arya" (Less pressure)	"The teachings are detailed"	Rigid and formal learning routes "We never had presentation"	○ Test-oriented assessment ○ Textbook-driven "We just focus on the material, counting every day"
3	Phy-sics	Aldi	In class	Accom-plished 4C	-	○ Teacher-driven ○ Less questions and answers "Hurry in teaching."	○ Teacher-driven ○ Textbook-driven	More teacher's control "He dominates the classroom"	Teacher-driven "He provides PPT, then continued to explain the lesson"

No	Subjects	Teacher name	Class-room	Lesson plan	Students' project	Result findings (students' statement) Aila	Diana	Darren	Jaka
						Provision of notes by the teacher Spoon-feeding activity "If he gives us a question and we were slow to solve it, he will solve it himself front of the class"	"He kind of full theory" More passivity "We never had group learning so far"		
4		Trinity	In Labor	Accom-plished 4C	Doing experiment	Facilitating and leading thoughts out. "The teaching media is fun and there are always new ideas in our meeting" Guidance, caring for, nurturing, and directing those who are to receive an education "If the lesson is still theory, she brings the tools to us" More students' participation	A balance between the educator's authority and the learner's autonomy "She is creative, you will not get bored studying with her" Student-centered learning "We always have a group learning"	Critical discussion to understand the materials/ Think critically "Easy to understand to study with her, she usually explains first, then gives us examples of questions, then we solve it, then gives another example, then resolved it again."	Dialogic negotiation of the learning routes with the teacher "Every different topic, she always finds a new way, so our lessons were not monotonous" Authentic formative and summative assessment "The learning meeting is structured; material, exercise, and test were taken in turn"

No	Subjects	Teacher name	Class-room	Lesson plan	Students' project	Result findings (students' statement)			
						Aila	Diana	Darren	Jaka
						"If there will be games, she prepares the game as well."			
5	Bio-logy	Evelyn	In class	Accom-plished 4C	Doing experiment	Guidance, nurturing "We are truly led in learning"	Appreciation to students' diverse "She teaches in the simple way"	○ Self-note taking ○ A balance between the educator's authority and the learner's autonomy "Often in groups, but usually we summarize the chapter at the beginning in the group, then we explain it in front of the class"	○ More students' participation ○ Active questions and answers ○ A balance between the educator's authority and the learner's autonomy "The learning model is presentation, after we explained, she will add if there was something missing from presentation"
6		Vivian	In Labor	-	(Create DNA molecule)	Unification of the perceived students' background knowledge "She assumes that we already understand everything, so those who don't understand will be overwhelmed"	Teacher-driven "She teaches in detail"	More teacher's control "She more often explaining, but we had presentation also"	More passivity "Almost the same as Mrs. Evelyn, the different is that she does not conclude after presentation, but at the end of the lesson."

From *table 4.3*, we can see that every teacher has different approach to teaching science. The researcher see that Mr. Arya, Mrs. Atia, Mrs. Vivian and Mr. Aldi are more into teacher-centered learning. While a student-centered learning approach was only practiced by Mrs. Evelyn, and Mrs. Trinity. It turns out that only two from six teachers in this school who applied student-centered learning, so generally this school is still dominated by teacher-centered learning approach. This argument drew based on the comparation between characteristics of student-centered learning and Islamic pedagogy as displayed in the table 2.2. (in chapter 2) with students' interview result.

4.4 Research Question #3 How do science learning resources in Islamic senior high school be chosen?

In this study, the researcher found that in the teaching of science, the teachers use various learning resources, including book, digital source, teacher made module. In detail, they are described as below

4.4.4 Book

In general, this school provide all students with book and e-book. The e-book was distributed to students' laptop at the beginning of the year, while the printed book is placed in each learning room. In a religious school, there is a practice of censorship from a certain book to maintain students' faith, adopting book from outside might be dangerous for school's belief. Thus, the researcher seeks to know whether this school also have the same case. The answer from teachers about book resources used in this school are various as described in the following excerpt:

> "The source book is Erlangga, I used to use book with author named Unggul Sudarmo, because it is more detailed, than other textbooks such as Petrucci, and general chemistry is which is also sometimes used".
>
> (Mr. Arya, 19/05/23)

> "Usually we use two sources here, one is Erlangga, the other is Grafindo which I currently use, but the students use Erlangga, because that's what the school provides".
>
> (Mrs. Atia, 22/05/23)

“As for the source book, I use Quadra, but this is my personal book, for students, they use Erlangga”.

(Mrs. Vivian, 19/05/23)

“We use textbook from Erlangga, Platinum, Campbell, and ESIS. Erlangga is the most common, ESIS is the best, everything is provided by the school, there are e-books too. They are distributed modules per KD, depending on the teacher”.

(Mrs. Evelyn, 19/05/23)

“Erlangga, Yudhishthira, each of which has as many children. I don't have to come from one book source. I used to say "please use any book that contains this material", so in the classroom it is our job to confirm the knowledge they had exploring from outside earlier, which from many sources, has it corrected or does it still need to be strengthened.”

(Mrs. Trinity, 19/05/23)

“One of the learning resources that I use is textbooks. This decision is from the institution”.

(Mr. Aldi, 22/05/23)

It turns out that in all science subjects, they use Erlangga book for students. But each science subject has different additional book source, such as ESIS, Platinum, Campbell in Biology subject, Quadra and Yudhistira in Physics subject, Petrucci and Grafindo in Chemistry. It implies that there is no limitation to adopt from a certain source. As for information, Erlangga is the first Indonesian publisher that focus on

school book and generally used in Indonesian school. While Petrucci book that Mr. Arya and Campbell book that Mrs. Vivian mentioned was published by Pearson, which is a British multinational publishing and education company. While Quadra, ESIS, Grafindo, and Platinum are Indonesian school book publisher.

4.4.5 Digital source

Beside books, the learning process in this school is also technologized by using digital application. For example, when having an experiment, some teachers refer to a virtual application:

> *"*In addition, I also use other sources such as learning applications, PhET media, etc.".
>
> (Mr. Aldi, 22/05/23)

> "We have an application called the Lab Maya, so students can do experiment virtually and it's close to the real thing".
>
> (Mrs. Trinity, 19/05/23)

Beside experiment use, a non-experiment learning process were also sourced from digital:

> "So, the source of information doesn't have to be a textbook, it can come from anywhere, it could be modules, videos learning, or join the Ruangguru.com community, and so on... if there are no alternative practicum materials, non in the virtual lab, so I will show them the video from YouTube."
>
> (Mrs. Trinity, 19/05/23)

The use of virtual app to support science learning is a nice thing in this school. Even the virtual lab provides a safe environment for student to do an experiment (Aljuhani et al., 2018), the use of an application to support science experiment in physics subjects is due to its limited number of tools and its useful to synchronize between virtual and real laboratories. However, the biology and chemistry subjects in this school seems does not utilize this app.

4.4.6 Teacher-made module

Learning Modules are tools that provide course material in a logical, sequential order, guiding students through content and assessments in an order determined by the instructor (ufl.edu, n.d.,). Modules are usually made by instructional designers, subject matter experts, or teachers. But in this school, teachers are mandatory to create module each semester, in addition most of them said that they develop, modify, and adapt their module from different sources, as shown in the following excerpt:

> "We made it ourselves for one semester"
>
> (Mr. Arya, 19/05/23)

> "I develop my own teaching material to increase students' understanding, such as worksheet, crossword puzzle, etc."
>
> (Mr. Aldi, 22/05/23)

"From all sources, we made it ourselves, when students are about to have practicum, I will share the practicum guide to them. I modified the working step from the source Tho."

(Mrs. Evelyn, 19/05/23)

"I made the students worksheet myself, I took the material from many sources, then made them myself too. I prefer worksheet than text book, so I made worksheet myself, gave it to my students. In MGMP, teachers can also get module there."

(Mrs. Vivian, 19/05/23)

"In MGMP, various modules are usually shared there, so according to the need, which part is fit with learning activity, so I use it"

(Mrs. Atia, 22/05/23)

"So, when I was in MGMP, one of them was in the modules that were distributed, it was embraced that the teachers should relate it to religion, so in that module this topic was also made, this verse is good, this topic is this verse, now that's done is in the module."

(Mrs. Trinity, 19/05/23)

Interestingly, more than one teacher mentioned about MGMP. MGMP stand for *Musyawarah Guru Mata Pelajaran* (subject teacher conference); the forum for teachers to share their work. In this forum, teachers are used to discuss and sharing everything related teaching and learning process. Usually, teachers who join this forum are those who has officially registered in data center, in *madrasah* they are registered

in SIMPATIKA while in school under MoEC are registered in DAPODIK. By having official account, they are able to access material from https://ayoguruberbagi.kemdikbud.go.id, where teachers can share each other's teaching materials. However, since teaching materials in this forum are made by teachers also, thus each teacher who download from this forum used to modify it according to their students' need. In addition, MGMP is also exist only in middle and senior high-school, while at the elementary level, it called KKG (*Kelompok Kerja Guru* or teacher forum) because their class teachers are teaching all subject in teaching.

4.5 Discussion

Integrating science with religion

Researchers to date have given a great deal of attention to the interrelationship between science and religion (e.g. Brickhouse et al., 2000; Shipman et al., 2002;). Many debates among scholars which talks about whether it is possible or not possible to connect science with religion. The nature of science which is based on observation and evidence while in religion is not necessarily accepted by those two aspects (academies, 2020). But according to the finding of this study, there were not found an indication where the teachers see science and religion as incompatible, all teacher were confident that science and religion is related and to connect them is possible.

The researcher argues that increasing commitment to intellectual values is more fruitful approach for a science teacher rather than arguing for impartial detachment,

because many adherents of different faiths and views also do high-quality work in the natural sciences and humanities, showing that religious commitment does not get in the way either (Erkki, 2021).

For example, when talking about creationism; it is not a scientific basis. But it does not mean that teachers are allowed to persuade learners to adopt certain belief, the teacher's goal is to help students understand scientific ideas and arguments as well as the evidence for them (Taber, 2017). Thus, the researcher argues that a teacher is encouraged to provide a solid understanding of scientific ideas that triggered students' critical and reasoning thinking, which is more important for the students' development and at the end embedded in themselves.

However, teachers as facilitators in the learning process must understand first their teaching beliefs, because it will determine the decisions that they make at the teaching process (Carvalho, 2016). When it comes to religious things, teacher should aware of their religious perception about science education. Especially when incorporating integration in the classroom which might have many type interpretations of its conception (Walker, 2019; Ali, 2020; Nasir et al., 2020; Sururin et al., 2021; Saidah et al., 2023).

In this study finding, the researcher found that the teacher in this school perceive the meaning of connecting religion to science divided into three types; they are to mention certain verses related to material, to use scientific information from the Qur'an, and to acknowledge the God's greatness in nature arrangement. It has the additional type, that the teachers were not necessarily must use certain verses of the

Qur'an or *hadith* to explain the relationship between science and religion. The emphasis of the greatness of the creator (reflection) in natural arrangements is also considered as connecting science with religion.

However, this finding also implies that there were a similarity with Sururin (2021) study about how integration were interpreted and practiced. Even the finding in this thesis found that the understanding of concept integration between science and religion is not limited in connecting verses/hadith with science, but the researcher still cannot see the teachers' argument that showing the belief that understanding of Islamic pedagogy is actually emphasis reasoning thinking and support science. While, the researcher argues that teacher needs to acknowledge that to help the students to develop and build their scientific paradigm is important more than transmitting knowledge.

Criticizing how the teachers in this school was utilizing the Qur'anic verses to be cited in their teaching and learning when it has a scientific information or moral value, the teacher must also aware that how scattered verses inspired previous Muslim scientists and philosophers at medieval era was not obtained from knowledge transmission. It is a culture of education that has embodied in their life, and we need to preserve it and not just accepting that the culture of scientific attitude in the medieval era was no longer portrayed in today's Muslim education or simply assume that it is contradict with Islamic value.

Approach to teaching science

The finding about teachers approach in this school practice is also interesting, because as a school which claim emphasize science, but majority science teachers in this school

still using teacher-centered learning which is not recommended in science teaching because it is student-centered learning approach which able students to act effectively, reflectively, critically, and critically in the classroom, as how the researcher has elaborated in literatures (see *sub-section 2.5*).

Criticizing the teaching implementation in this school, the school claimed to teach according to the 21st needs such as 4C; Critical thinking, Creativity, Communication and Collaboration. But when the teacher simply writes down the answers to the physics calculation questions, explaining chemistry and biology material, how the students' critical thinking and creativity could be obtained?

The use of group discussion to developing students' communication and collaboration skill is also only found in Biology classroom. While there were many physics and chemistry material to be discussed too (Muslim, 2015; Arif et al., 2018; Hikmawati et al., 2021). Talking about the school facilities based on observation, it seems to be adequate to support science learning, but maximizing the facilities function is still need to be improved in this school.

For example, the science learning in this school occurs in the classroom and laboratory. the classroom functions as a place for theoretical and practical learning activities that do not require special equipment, while the laboratory functions as a space for practical learning that requires special equipment (Kemendikbudristek, 2023). But research to date widely believed that the laboratory provides the only place in the school where certain skills, abilities, and understandings can be developed; the laboratory provides unique modes of teaching, learning, and assessment (Hofstein,

2017). So, it will be better if the science learning in the school does not limiting certain activities or certain learning goal in a certain place in school.

Referring back to Pickens' (2005) definition about perception, where the teacher's approach is influenced by teacher belief about teaching, and Kember (1997) about the practice of teaching approach is influenced by the belief about how the teaching approach should be implemented. Thus, the teaching approaches in this school supposed to be influenced by their belief about teaching. The student-centered approach can be implemented in either classroom or laboratory when the science education can be comprehended by all practitioners.

Talking about teacher belief about teaching, the researcher has initial assumption that teachers' previous teaching experience and or teacher previous education background does effects. Mrs. Trinity who are experienced in teaching in school which applied Singapore curriculum, might influence her teaching (e.g she uses student-centered approach) in this school until now, but uniquely Mrs. Evelyn who experienced teaching in *madrasah* only, also practices the student-center learning approach in this school. The same case happened to Mrs. Atia who experienced in teaching in public high school previously, does not practice a student-centered learning. So, the researcher eager to know the what factors that influence teacher approach to teaching because the researcher see that all teachers acknowledged the important of science according to religion, but it seems like they have different belief about how science teaching must be implemented in the classroom. This evidence supports

Sahin's (2018) argument that Muslims nowadays do not have a clear concept of education.

Science learning sources

Refer to finding of book resources in this school, in some cases, faith-based schools may prefer to use science books published by publishers that align with their religious beliefs or incorporate religious perspectives into scientific topics. This can be by selecting publishers that approach scientific subjects from a particular religious worldview or include faith-based interpretations alongside scientific explanations. But this school does not limit certain book to use as students' source to study, although Erlangga is a book publisher which provided by the school for all school members. So, the researcher concludes that there are no certain learning resources that determined by this school.

Digital source in this school is only seems to be utilized in Physics subject, all teacher utilized a virtual lab named labmaya and PhET. While science learning such as Biology and Chemistry required practicum to provide effective skill acquisition and hands-on experience, and the use of virtual lab can make maximize that experience, students feel like they are working with real authentic devices in real authentic spaces (Potkonjak et al., 2016). Of course, the school facilities have provided laboratory room to support this learning, but the use of technology-based such as virtual lab is needed to be emphasized, especially if the aim of school is to create high quality human resources in the mastery of science and technology. Here, the researcher does not

highlight the use of a virtual laboratory by neglecting the physical lab, but to use of the combination of a virtual lab and the physical lab is valued in science education undoubtedly (Jong et al., 2013).

For example, in physic subject, the physic teacher saying that she uses the virtual lab to help the students' critical thinking and to help her assessment of the student's skill because it will surely will be found when the experiment result is different between real practice and app use, limited tools and materials in physical lab versus the unlimited use in the virtual lab, thus the use of virtual lab is very helpful:

Talking about the teacher resource when utilizing MGMP forum to create their module, here the researcher argues that there still be an indication that the widespread of the conception on how to connect science and religion been widely source in this forum.

The teachers which joining MGMP forum always highlighting that even if in module that been widely spread in teacher forum made it easier for them, each teacher to must also need to refer back to their learning need, here it is depending on the teacher themselves. But what is to be the concern not on how the teacher would take this responsibility, but until when these share cycle will be looped? Even if the teachers are aware that they not necessarily must use a fixed module made by other teacher, but to what extent teachers can guarantee that their perspective on how to connect science and religion is the correct one? Here, the researcher argues that there must be another intensive and massive educational training on the concept of integrating science and religion for the classroom by a government.

CHAPTER V

CONCLUSION & RECOMMENDATION

5.1 Introduction

This section consists of three parts. The first part is conclusion, the second part covers limitations of the study that inform readers of some cautions in considering the claims made in this study which applied according to study scope and methodology context. The last part contains recommendations for science teachers and future research.

5.2 Conclusion

Based on the presented finding and discussions, the researcher still sees the complexity on the science education when relates it with religion. From this finding, science teachers do not see religion as a barrier to study science, they perceive science as not contradicting religious beliefs and believe that their belief supports them in learning science.

In addition, all teachers in this school are used to relating religion with science learning in the classroom by mentioning some verses and hadith related to materials and emphasizing the God's greatness in a natural arrangement. But the researcher still cannot see any of the school member who mention that Islamic pedagogy emphasize student to have a reasoning and critical thinking in science education. While many researchers have argued that education in Islam is comprehensive, it is emphasizing the student's development as the same as the ideal learning theory that is well known now.

As a result, the teachers approach to teaching science in this Islamic-based school are divided into two types; one is those who teach with student-centered learning approach and the second type is those who teach with teacher-centered learning approach. This different approach is evidence that the clear concept of education, especially on science education is still needed, especially in the school which aiming to develop students critical thinking, but the fact is that there are only two from six teachers in this school which using student-centered learning to flourish students' competencies.

The final finding of this research is that the learning resources for science learning in this school are unlimited. The teachers utilize the teacher's forum as their resource for creating their modified teaching module. However, it seems like how the teacher perceive the concept of connecting religion into science was inspired from resource in this forum. The freedom of learning from everywhere is a sign that this school give authority to each member of this school to filter by themselves. But the researcher argues that there must also a clear understanding about the relationship between science education and religious teaching about education concept, so teachers can have a compact movement in educating their students. There is no guarantee that the teaching practitioners filter things correctly unless there is a clear standard about it.

5.3 Limitations

First, this study participants consists of six teachers, but the lesson plans collected are only from four teachers due to the research ethic. Among three methods that researcher utilized, the document analysis part has incomplete lesson plans and student worksheet which represent each teacher.

Secondly, the researcher did not collect comprehensive data from all related school personnel such as interview with the principal, administrators, and parents. Instead, the researcher observed the classroom and interviewed the teachers and some students. The researcher also collected some lesson plans and observed the classroom environment to confirm data of the participants. Thus, this study needs a further study to depict the science teaching and learning in the classroom using Islamic pedagogy framework through a direct teaching and learning in the classroom observation.

However, the researcher did not observe the learning process due to limited timeframe of the research. The researcher conducted an unstructured interview with some students to gather their opinion about their teaching and learning process. These students were selected purposively based on their classroom and gender representation. A representative from each ranking grouping would be a better choice to strengthen the draw conclusion from students' opinion.

5.4 Recommendations

5.4.1 Science Teachers

Examining from the students' opinion toward the teacher's approach to teaching and their reaction toward the activity given has enabled the researcher to discover significant aspects of the students' knowledge construction. Some recommendation can be derived from the result of this study for science teachers. First, science teachers need to be more fun in teaching, a rigid atmosphere will make students feel a little pressured or tense in the learning process. Second, science teachers are encouraged to be innovative in teaching, so students will eager to study science within a long duration. Third, science teachers are encouraged to minimize the teacher-centered learning approach for the sake of learner development.

5.4.2 Future researchers

From data in *table 4.*3, what has interpreted as the implementation of Islamic pedagogy by the researcher is still a simple study to widening the understanding about how is education implemented according to Islamic pedagogy. The science teachers approach to teaching was not observed in the classroom. So, the researcher recommends for future research to employ observation method to have more comprehensive result regarding teaching approach in Islamic context.

In this study, the teacher's approach to teaching were various. Thus, the researcher also recommends the future researcher to investigates the reason for this

difference practice, knowing that teaching experience and education background of a teacher could not be determinant to employ a same teaching approach.

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APPENDIX

Appendix 1 Teacher's identity survey

IDENTITAS GURU MATA PELAJARAN IPA

Data

1. Nama :
2. Mapel yang diajarkan :

Latar belakang pendidikan

SD :
SMP :
SMA :
S1-Jurusan :
S2-Jurusan (jika ada) :

Latar belakang Mengajar

1. Sudah berapa lama Bapak/Ibu mengajar IPA di sekolah ini?
2. Sudah berapa tahun Bapak/Ibu mengajar/pernah mengajarkan mata pelajaran IPA?
3. Apakah Bapak/Ibu memiliki pengalaman mengajar di institusi sebelumnya (serta mata pelajarannya)?

translation

IDENTITY OF SCIENCE SUBJECT TEACHER

Data

1. Name :
2. Teachable maple :

Educational background

SD:
Junior High School :
Senior High School :
Bachelor-Department :
Magister-Department (if any) :

Teaching Background

1. How long have you been teaching science at this school?
2. How many years have you been teaching/ever teaching science subjects?
3. Do you have any previous experience teaching at the institution (as well as the subject)?

Appendix 2 Research interview instruments

INSTRUMEN PENELITIAN

Hakikat Sains dan Hakikat Agama (Billingsley, 2013)

1. Apakah menurut Bapak/Ibu, sains mendukung atau bertentangan dengan agama? (coba jelaskan)
2. Menurut Bapak/Ibu, pentingkah mengaitkan agama dalam mata pelajaran IPA? (jelaskan bagaimana/mengapa tidak)
3. Apakah menurut Bapak/Ibu, ajaran Islam membolehkan/mendukung sains dan penalaran? (jelaskan bagaimana/mengapa tidak)
4. Apakah menurut Bapak/Ibu, orang lain mungkin saja memiliki pandangan yang berbeda dari apa yang telah Bapak/Ibu sampaikan tentang sains (mengenai kaitannya dengan ajaran Islam)? (jelaskan bagaimana/mengapa tidak)

Pertanyaan wawancara tentang pengajaran di kelas (Tao, 2013)

1. Berapa jam mengajar yang Anda alokasikan untuk sains per minggu? Apakah keputusan ini dari tingkat sekolah, provinsi, atau nasional?
2. Apakah Anda menggunakan buku teks dalam pelajaran sains Anda? Jika ya, bolehkah saya melihat buku teks tersebut?
3. Bagaimana Anda menggunakannya? Apakah Anda menggunakannya sebagai dasar utama untuk mengajar atau sumber tambahan? Jika tidak, bahan apa yang Anda gunakan untuk membimbing pengajaran IPA?
4. Dari mana Anda mendapatkan materi mengajar, dan bagaimana Anda menyiapkannya untuk pembelajaran di kelas?
5. Dari mana Anda mendapatkan bahan untuk melakukan eksperimen atau investigasi?
6. Apakah anda kesulitan mendapatkan bahan-bahan tersebut? Mengapa?

translation

Nature of Science and Nature of Religion

1. Does science support or contradict religion?
2. Is it important to connect religion in the science classroom? (Explain how/why not)
3. Do you think that Islamic teaching allows/supports science and reasoning thinking? (Explain how/why not)
4. Do you think other people might have another perspective about science in terms of Islamic teaching? (Explain how/why not)

Interview questions regarding teaching in the classroom (Tao, 2013)

1. How many teaching hours are you allocated to science per week? Is the decision at the school, state/provincial, or national levels?
2. Do you use textbooks in your science lessons? If yes, may I have a look at the textbook?
3. How do you use it? Do you use it as a primary basis for teaching or a supplementary resource? If not, what materials do you use for guiding science teaching?
4. Where do you get the materials, and how do you prepare them for each student?
5. Where do you get materials for conducting experiments or investigations?
6. Do you have difficulty getting these materials?

SALINAN LAMPIRAN I
PERATURAN MENTERI PENDIDIKAN DAN KEBUDAYAAN
NOMOR 35 TAHUN 2018
TENTANG
PERUBAHAN ATAS PERATURAN MENTERI PENDIDIKAN
DAN KEBUDAYAAN NOMOR 58 TAHUN 2014
TENTANG KURIKULUM 2013 SEKOLAH MENENGAH
PERTAMA/MADRASAH TSANAWIYAH

KERANGKA DASAR DAN STRUKTUR KURIKULUM
SEKOLAH MENENGAH PERTAMA/MADRASAH TSANAWIYAH

I. PENDAHULUAN

A. Latar Belakang

1. Pengertian Kurikulum

Undang-Undang Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional menyebutkan bahwa kurikulum adalah seperangkat rencana dan pengaturan mengenai tujuan, isi, dan bahan pelajaran serta cara yang digunakan sebagai pedoman penyelenggaraan kegiatan pembelajaran untuk mencapai tujuan pendidikan tertentu. Berdasarkan pengertian tersebut, ada dua dimensi kurikulum, yang pertama adalah rencana dan pengaturan mengenai tujuan, isi, dan bahan pelajaran, sedangkan yang kedua adalah cara yang digunakan untuk kegiatan pembelajaran.

Kurikulum 2013 yang diberlakukan mulai tahun ajaran 2013/2014 memenuhi kedua dimensi tersebut.

2. Rasional Pengembangan Kurikulum 2013

Kurikulum 2013 dikembangkan berdasarkan faktor-faktor sebagai berikut:

a. Tantangan Internal

Tantangan internal antara lain terkait dengan kondisi pendidikan dikaitkan dengan tuntutan pendidikan yang mengacu kepada 8 (delapan) Standar Nasional Pendidikan yang meliputi standar isi, standar proses, standar kompetensi lulusan, standar pendidik dan tenaga kependidikan, standar sarana dan prasarana, standar pengelolaan, standar pembiayaan, dan standar penilaian pendidikan.

Tantangan internal lainnya terkait dengan perkembangan penduduk Indonesia dilihat dari pertumbuhan penduduk usia produktif. Saat ini jumlah penduduk Indonesia usia produktif (15-64 tahun) lebih banyak dari usia tidak produktif (anak-anak berusia 0-14 tahun dan orang tua berusia 65 tahun ke atas). Jumlah penduduk usia produktif ini akan mencapai puncaknya pada tahun 2020-2035 pada saat angkanya mencapai 70%. Oleh sebab itu tantangan besar yang dihadapi adalah bagaimana mengupayakan agar sumberdaya manusia usia produktif yang melimpah ini dapat ditransformasikan menjadi sumberdaya manusia yang memiliki kompetensi dan keterampilan melalui pendidikan agar tidak menjadi beban.

b. Tantangan Eksternal

Tantangan eksternal antara lain terkait dengan arus globalisasi dan berbagai isu yang terkait dengan masalah lingkungan hidup, kemajuan teknologi dan informasi, kebangkitan industri kreatif dan budaya, dan perkembangan pendidikan di tingkat internasional. Arus globalisasi akan menggeser pola hidup masyarakat dari agraris dan perniagaan tradisional menjadi masyarakat industri dan perdagangan modern seperti dapat terlihat di *World Trade Organization* (WTO), *Association of Southeast Asian Nations* (ASEAN) *Community*, *Asia-Pacific Economic Cooperation* (APEC), dan ASEAN *Free Trade Area* (AFTA). Tantangan eksternal juga terkait dengan pergeseran kekuatan ekonomi dunia, pengaruh dan imbas teknosains serta mutu, investasi, dan transformasi bidang pendidikan. Keikutsertaan Indonesia di dalam studi *International Trends in International Mathematics and Science Study* (TIMSS) dan *Program for International Student Assessment* (PISA) sejak tahun 1999 juga menunjukkan bahwa capaian anak-anak Indonesia tidak menggembirakan dalam beberapa kali laporan yang dikeluarkan TIMSS dan PISA. Hal ini disebabkan antara lain banyaknya materi uji yang ditanyakan di TIMSS dan PISA tidak terdapat dalam kurikulum Indonesia.

c. Penyempurnaan Pola Pikir

Kurikulum 2013 dikembangkan dengan penyempurnaan pola pikir sebagai berikut:

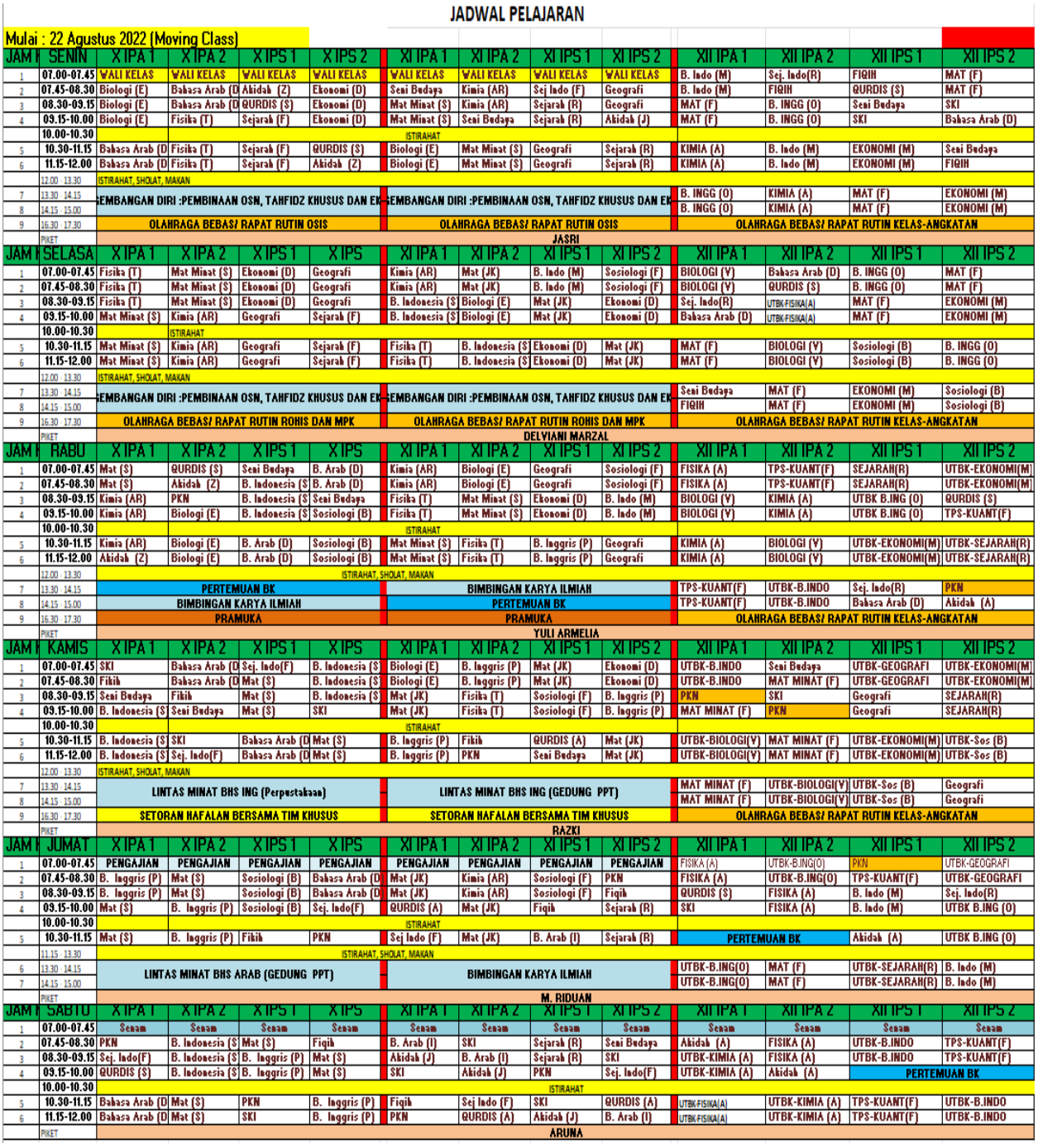
1) penguatan pola pembelajaran yang berpusat pada peserta didik. Peserta didik harus memiliki pilihan-pilihan terhadap materi yang dipelajari dan gaya belajarnya (*learning style*) untuk memiliki kompetensi yang sama;
2) penguatan pola pembelajaran interaktif (interaktif guru-peserta didik-masyarakat-lingkungan alam, sumber/media lainnya);
3) penguatan pola pembelajaran secara jejaring (peserta didik dapat menimba ilmu dari siapa saja dan dari mana saja yang dapat dihubungi serta diperoleh melalui internet);
4) penguatan pembelajaran aktif-mencari (pembelajaran siswa aktif mencari semakin diperkuat dengan pendekatan pembelajaran saintifik);
5) penguatan pola belajar sendiri dan kelompok (berbasis tim);
6) penguatan pembelajaran berbasis multimedia;
7) penguatan pola pembelajaran berbasis klasikal-massal dengan tetap memperhatikan pengembangan potensi khusus yang dimiliki setiap peserta didik;
8) penguatan pola pembelajaran ilmu pengetahuan jamak (*multidisciplines*); dan
9) penguatan pola pembelajaran kritis.

d. Penguatan Tata Kelola Kurikulum

Kurikulum 2013 dilakukan penguatan tata kelola sebagai berikut:

1) penguatan tata kerja guru lebih bersifat kolaboratif;
2) penguatan manajeman sekolah melalui penguatan kemampuan manajemen kepala sekolah sebagai pimpinan kependidikan (*educational leader*); dan
3) penguatan sarana dan prasarana untuk kepentingan manajemen dan proses pembelajaran.

Appendix 4 Time table lesson



JADWAL PELAJARAN

Mulai : 22 Agustus 2022 (Moving Class)

JAM KE	SENIN	X IPA 1	X IPA 2	X IPS 1	X IPS 2	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	WALI KELAS	WALI KELAS	WALI KELAS	WALI KELAS	WALI KELAS	WALI KELAS	WALI KELAS	WALI KELAS	B. Indo (M)	Sej. Indo(R)	FIQIH	MAT (F)
2	07.45-08.30	Biologi (E)	Bahasa Arab (D	Akidah (Z)	Ekonomi (D)	Seni Budaya	Kimia (AR)	Sej Indo (F)	Geografi	B. Indo (M)	FIQIH	QURDIS ($)	MAT (F)
3	08.30-09.15	Biologi (E)	Bahasa Arab (D	QURDIS ($)	Ekonomi (D)	Mat Minat ($)	Kimia (AR)	Sejarah (R)	Geografi	MAT (F)	B. INGG (O)	Seni Budaya	SKI
4	09.15-10.00	Biologi (E)	Fisika (T)	Sejarah (F)	Ekonomi (D)	Mat Minat ($)	Seni Budaya	Sejarah (R)	Akidah (J)	MAT (F)	B. INGG (O)	SKI	Bahasa Arab (D)
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	Bahasa Arab (D	Fisika (T)	Sejarah (F)	QURDIS ($)	Biologi (E)	Mat Minat ($)	Geografi	Sejarah (R)	KIMIA (A)	B. Indo (M)	EKONOMI (M)	Seni Budaya
6	11.15-12.00	Bahasa Arab (D	Fisika (T)	Sejarah (F)	Akidah (Z)	Biologi (E)	Mat Minat ($)	Geografi	Sejarah (R)	KIMIA (A)	B. Indo (M)	EKONOMI (M)	FIQIH
	12.00 13.30	ISTIRAHAT, SHOLAT, MAKAN											
7	13.30 14.15	EMBANGAN DIRI :PEMBINAAN OSN, TAHFIDZ KHUSUS DAN EK				EMBANGAN DIRI :PEMBINAAN OSN, TAHFIDZ KHUSUS DAN EK				B. INGG (O)	KIMIA (A)	MAT (F)	EKONOMI (M)
8	14.15 15.00									B. INGG (O)	KIMIA (A)	MAT (F)	EKONOMI (M)
9	16.30 17.30	OLAHRAGA BEBAS/ RAPAT RUTIN OSIS				OLAHRAGA BEBAS/ RAPAT RUTIN OSIS				OLAHRAGA BEBAS/ RAPAT RUTIN KELAS-ANGKATAN			
	PIKET	JASRI											

JAM KE	SELASA	X IPA 1	X IPA 2	X IPS 1	X IPS	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	Fisika (T)	Mat Minat ($)	Ekonomi (D)	Geografi	Kimia (AR)	Mat (JK)	B. Indo (M)	Sosiologi (F)	BIOLOGI (V)	Bahasa Arab (D)	B. INGG (O)	MAT (F)
2	07.45-08.30	Fisika (T)	Mat Minat ($)	Ekonomi (D)	Geografi	Kimia (AR)	Mat (JK)	B. Indo (M)	Sosiologi (F)	BIOLOGI (V)	QURDIS ($)	B. INGG (O)	MAT (F)
3	08.30-09.15	Fisika (T)	Mat Minat ($)	Ekonomi (D)	Geografi	B. Indonesia ($)	Biologi (E)	Mat (JK)	Ekonomi (D)	Sej. Indo(R)	UTBK-FISIKA(A)	MAT (F)	EKONOMI (M)
4	09.15-10.00	Mat Minat ($)	Kimia (AR)	Geografi	Sejarah (F)	B. Indonesia ($)	Biologi (E)	Mat (JK)	Ekonomi (D)	Bahasa Arab (D)	UTBK-FISIKA(A)	MAT (F)	EKONOMI (M)
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	Mat Minat ($)	Kimia (AR)	Geografi	Sejarah (F)	Fisika (T)	B. Indonesia ($)	Ekonomi (D)	Mat (JK)	MAT (F)	BIOLOGI (V)	Sosiologi (B)	B. INGG (O)
6	11.15-12.00	Mat Minat ($)	Kimia (AR)	Geografi	Sejarah (F)	Fisika (T)	B. Indonesia ($)	Ekonomi (D)	Mat (JK)	MAT (F)	BIOLOGI (V)	Sosiologi (B)	B. INGG (O)
	12.00 13.30	ISTIRAHAT, SHOLAT, MAKAN											
7	13.30 14.15	EMBANGAN DIRI :PEMBINAAN OSN, TAHFIDZ KHUSUS DAN EK				EMBANGAN DIRI :PEMBINAAN OSN, TAHFIDZ KHUSUS DAN EK				Seni Budaya	MAT (F)	EKONOMI (M)	Sosiologi (B)
8	14.15 15.00									FIQIH	MAT (F)	EKONOMI (M)	Sosiologi (B)
9	16.30 17.30	OLAHRAGA BEBAS/ RAPAT RUTIN ROHIS DAN MPK				OLAHRAGA BEBAS/ RAPAT RUTIN ROHIS DAN MPK				OLAHRAGA BEBAS/ RAPAT RUTIN KELAS-ANGKATAN			
	PIKET	DELVIANI MARZAL											

JAM KE	RABU	X IPA 1	X IPA 2	X IPS 1	X IPS	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	Mat ($)	QURDIS ($)	Seni Budaya	B. Arab (D)	Kimia (AR)	Biologi (E)	Geografi	Sosiologi (F)	FISIKA (A)	TPS-KUANT(F)	SEJARAH(R)	UTBK-EKONOMI(M)
2	07.45-08.30	Mat ($)	Akidah (Z)	B. Indonesia ($)	B. Arab (D)	Kimia (AR)	Biologi (E)	Geografi	Sosiologi (F)	FISIKA (A)	TPS-KUANT(F)	SEJARAH(R)	UTBK-EKONOMI(M)
3	08.30-09.15	Kimia (AR)	PKN	B. Indonesia ($)	Seni Budaya	Fisika (T)	Mat Minat ($)	Ekonomi (D)	B. Indo (M)	BIOLOGI (V)	KIMIA (A)	UTBK B.ING (O)	QURDIS ($)
4	09.15-10.00	Kimia (AR)	Biologi (E)	B. Indonesia ($)	Sosiologi (B)	Fisika (T)	Mat Minat ($)	Ekonomi (D)	B. Indo (M)	BIOLOGI (V)	KIMIA (A)	UTBK B.ING (O)	TPS-KUANT(F)
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	Kimia (AR)	Biologi (E)	B. Arab (D)	Sosiologi (B)	Mat Minat ($)	Fisika (T)	B. Inggris (P)	Geografi	KIMIA (A)	BIOLOGI (V)	UTBK-EKONOMI(M)	UTBK-SEJARAH(R)
6	11.15-12.00	Akidah (Z)	Biologi (E)	B. Arab (D)	Sosiologi (B)	Mat Minat ($)	Fisika (T)	B. Inggris (P)	Geografi	KIMIA (A)	BIOLOGI (V)	UTBK-EKONOMI(M)	UTBK-SEJARAH(R)
	12.00 13.30	ISTIRAHAT, SHOLAT, MAKAN											
7	13.30 14.15	PERTEMUAN BK				BIMBINGAN KARYA ILMIAH				TPS-KUANT(F)	UTBK-B.INDO	Sej. Indo(R)	PKN
8	14.15 15.00	BIMBINGAN KARYA ILMIAH				PERTEMUAN BK				TPS-KUANT(F)	UTBK-B.INDO	Bahasa Arab (D)	Akidah (A)
9	16.30 17.30	PRAMUKA				PRAMUKA				OLAHRAGA BEBAS/ RAPAT RUTIN KELAS-ANGKATAN			
	PIKET	YULI ARMELIA											

JAM KE	KAMIS	X IPA 1	X IPA 2	X IPS 1	X IPS	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	SKI	Bahasa Arab (D	Sej. Indo(F)	B. Indonesia ($)	Biologi (E)	B. Inggris (P)	Mat (JK)	Ekonomi (D)	UTBK-B.INDO	Seni Budaya	UTBK-GEOGRAFI	UTBK-EKONOMI(M)
2	07.45-08.30	Fikih	Bahasa Arab (D	Mat ($)	B. Indonesia ($)	Biologi (E)	B. Inggris (P)	Mat (JK)	Ekonomi (D)	UTBK-B.INDO	MAT MINAT (F)	UTBK-GEOGRAFI	UTBK-EKONOMI(M)
3	08.30-09.15	Seni Budaya	Fikih	Mat ($)	B. Indonesia ($)	Mat (JK)	Fisika (T)	Sosiologi (F)	B. Inggris (P)	PKN	SKI	Geografi	SEJARAH(R)
4	09.15-10.00	B. Indonesia ($)	Seni Budaya	Mat ($)	SKI	Mat (JK)	Fisika (T)	Sosiologi (F)	B. Inggris (P)	MAT MINAT (F)	PKN	Geografi	SEJARAH(R)
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	B. Indonesia ($)	SKI	Bahasa Arab (D	Mat ($)	B. Inggris (P)	Fikih	QURDIS (A)	Mat (JK)	UTBK-BIOLOGI(V)	MAT MINAT (F)	UTBK-EKONOMI(M)	UTBK-Sos (B)
6	11.15-12.00	B. Indonesia ($)	Sej. Indo(F)	Bahasa Arab (D	Mat ($)	B. Inggris (P)	PKN	Seni Budaya	Mat (JK)	UTBK-BIOLOGI(V)	MAT MINAT (F)	UTBK-EKONOMI(M)	UTBK-Sos (B)
	12.00 13.30	ISTIRAHAT, SHOLAT, MAKAN											
7	13.30 14.15	LINTAS MINAT BHS ING (Perpustakaan)				LINTAS MINAT BHS ING (GEDUNG PPT)				MAT MINAT (F)	UTBK-BIOLOGI(V)	UTBK-Sos (B)	Geografi
8	14.15 15.00									MAT MINAT (F)	UTBK-BIOLOGI(V)	UTBK-Sos (B)	Geografi
9	16.30 17.30	SETORAN HAFALAN BERSAMA TIM KHUSUS				SETORAN HAFALAN BERSAMA TIM KHUSUS				OLAHRAGA BEBAS/ RAPAT RUTIN KELAS-ANGKATAN			
	PIKET	RAZKI											

JAM KE	JUMAT	X IPA 1	X IPA 2	X IPS 1	X IPS	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	PENGAJIAN	PENGAJIAN	PENGAJIAN	PENGAJIAN	PENGAJIAN	PENGAJIAN	PENGAJIAN	PENGAJIAN	FISIKA (A)	UTBK-B.ING(O)	PKN	UTBK-GEOGRAFI
2	07.45-08.30	B. Inggris (P)	Mat ($)	Sosiologi (B)	Bahasa Arab (D	Mat (JK)	Kimia (AR)	Sosiologi (F)	PKN	FISIKA (A)	UTBK-B.ING(O)	TPS-KUANT(F)	UTBK-GEOGRAFI
3	08.30-09.15	B. Inggris (P)	Mat ($)	Sosiologi (B)	Bahasa Arab (D	Mat (JK)	Kimia (AR)	Sosiologi (F)	Fiqih	QURDIS ($)	FISIKA (A)	B. Indo (M)	Sej. Indo(R)
4	09.15-10.00	Mat ($)	B. Inggris (P)	Sosiologi (B)	Sej. Indo(F)	QURDIS (A)	Mat (JK)	Fiqih	Sejarah (R)	SKI	FISIKA (A)	B. Indo (M)	UTBK B.ING (O)
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	Mat ($)	B. Inggris (P)	Fikih	PKN	Sej Indo (F)	Mat (JK)	B. Arab (I)	Sejarah (R)	PERTEMUAN BK		Akidah (A)	UTBK B.ING (O)
	11.15 13.30	ISTIRAHAT, SHOLAT, MAKAN											
6	13.30 14.15	LINTAS MINAT BHS ARAB (GEDUNG PPT)				BIMBINGAN KARYA ILMIAH				UTBK-B.ING(O)	MAT (F)	UTBK-SEJARAH(R)	B. Indo (M)
7	14.15 15.00									UTBK-B.ING(O)	MAT (F)	UTBK-SEJARAH(R)	B. Indo (M)
	PIKET	M. RIDUAN											

JAM KE	SABTU	X IPA 1	X IPA 2	X IPS 1	X IPS	XI IPA 1	XI IPA 2	XI IPS 1	XI IPS 2	XII IPA 1	XII IPA 2	XII IPS 1	XII IPS 2
1	07.00-07.45	Senam	Senam	Senam	Senam	Senam	Senam	Senam	Senam	Senam	Senam	Senam	Senam
2	07.45-08.30	PKN	B. Indonesia ($)	Mat ($)	Fiqih	B. Arab (I)	SKI	Sejarah (R)	Seni Budaya	Akidah (A)	FISIKA (A)	UTBK-B.INDO	TPS-KUANT(F)
3	08.30-09.15	Sej. Indo(F)	B. Indonesia ($)	B. Inggris (P)	Mat ($)	Akidah (J)	B. Arab (I)	Sejarah (R)	SKI	UTBK-KIMIA (A)	FISIKA (A)	UTBK-B.INDO	TPS-KUANT(F)
4	09.15-10.00	QURDIS ($)	B. Indonesia ($)	B. Inggris (P)	Mat ($)	SKI	Akidah (J)	PKN	Sej. Indo(F)	UTBK-KIMIA (A)	Akidah (A)	PERTEMUAN BK	
	10.00-10.30	ISTIRAHAT											
5	10.30-11.15	Bahasa Arab (D	Mat ($)	PKN	B. Inggris (P)	Fiqih	Sej Indo (F)	SKI	QURDIS (A)	UTBK-FISIKA(A)	UTBK-KIMIA (A)	TPS-KUANT(F)	UTBK-B.INDO
6	11.15-12.00	Bahasa Arab (D	Mat ($)	SKI	B. Inggris (P)	PKN	QURDIS (A)	Akidah (J)	B. Arab (I)	UTBK-FISIKA(A)	UTBK-KIMIA (A)	TPS-KUANT(F)	UTBK-B.INDO
	PIKET	ARUNA											

Appendix 5 School vision and mission

LAMPIRAN :
Keputusan : Kepala MAN
Nomor : Tahun 2020

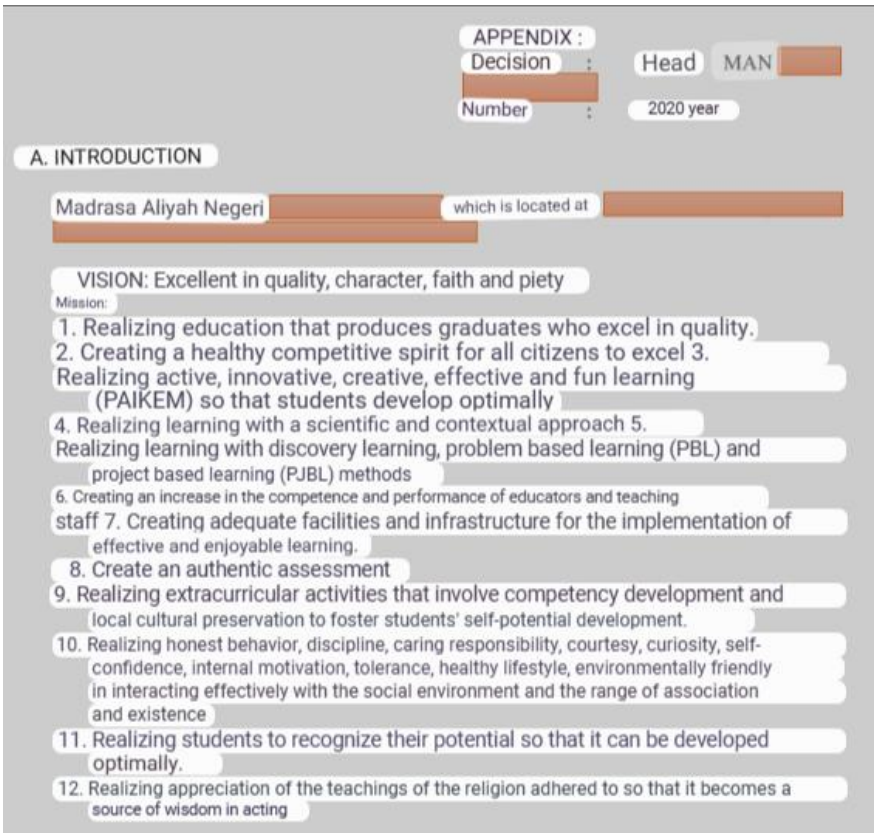
A. PENDAHULUAN

Madrasah Aliyah Negeri yang beralamat di

VISI : Unggul dalam mutu, berkarakter, beriman dan bertaqwa
Misi :

1. Mewujudkan pendidikan yang menghasilkan lulusan yang unggul dalam mutu.
2. Mewujudkan semangat kompetitif secara sehat kepada seluruh warga untuk berprestasi
3. Mewujudkan pembelajaran aktif, inovatif, kreatif, efektif, dan menyenangkan (PAIKEM) sehingga siswa berkembang secara optimal
4. Mewujudkan pembelajaran dengan pendekatan saintifik dan kontekstual
5. Mewujudkan pembelajaran dengan metode discovery learning, problem based learning (PBL) dan project based learning (PJBL)
6. Mewujudkan peningkatan kompetensi dan kinerja pendidik dan tenaga pendidik
7. Mewujudkan sarana dan prasarana yang memadai untuk terlaksananya pembelajaran yang efektif dan menyenangkan.
8. Mewujudkan penilaian yang autentik
9. Mewujudkan kegiatan ekstrakulikuker yang menyangkut pengembangan kompetensi dan pelestarian budaya lokal untuk menumbuhkan kembangkan potensi diri siswa.
10. Mewujudkan prilaku jujur, disiplin, tanggung jawab peduli, santun, rasa ingin tahu, percaya diri, motivasi internal, toleransi, berpola hidup sehat, ramah lingkungan dalam berinteraksi secara efektif dengan lingkungan sosial dan alam jangkauan pergaulan dan keberadaanya
11. Mewujudkan siswa untuk mengenali potensi dirinya sehingga dapat dikembangkan secara optimal.
12. Mewujudkan penghayatan terhadap ajaran agama yang dianut sehingga menjadi sumber kearifan dalam bertindak

translation



Appendix 6 Lesson plan

RENCANA PELAKSANAAN PEMBELAJARAN KIMIA

Sekolah	**: SMA**	**Kelas/Semester**	**: XII / 1**	**KD**	**: 3.1, 3.2 dan 4.1, 4.2**
Mata Pelajaran	**: KIMIA**	**Alokasi Waktu**	**: 2 x 45 menit**	**Pertemuan ke**	**: 1**
Materi	:	Sifat Koligatif Larutan			

A, TUJUAN

- Memahami penggunaan garam untuk mencairkan salju.
- Memahami penjelasan tentang sifat koligatif larutan dengan menggunakan diagram P-T
- Menganalisis dan menyimpulan penyebab sifat koligatif larutan
- Menganalisis perbedaaan sifat koligatif larutan nonelektrolit dan sifat koligatif larutan elektrolit.
- Merancang percobaan sifat koligatif larutan, misalnya penurunan titik bekularutan nonelektrolit dan larutan elektrolit serta melaporkan hasil percobaan.
- Melakukan percobaan sifat koligatif larutan, misalnya penurunan titik bekularutan nonelektrolit dan larutan elektrolit serta melaporkan hasil percobaan.
- Menentukan derajat pengionan zat elektrolit berdasarkan data percobaan.
- Menyelesaikan perhitungan kimia terkait sifat koligatif larutan elektrolit dan nonelektrolit.
- Memaparkan terapan sifat koligatif dalam kehidupan sehari-hari misalnya membuat es krim, memasak, dan mencegah pembekuan air radiator.
- Memahami sifat koligatif larutan elektrolit dan nonelektrolit
- Membedakan sifat koligatif larutan elektrolit dan larutan nonelektrolit
- Melakukan percobaan untuk menentukan derajat pengionan
- Menganalisis data percobaan untuk menentukan derajat pengionan

B, LANGKAH-LANGKAH PEMBELAJARAN

Media : ➢ *Worksheet atau lembar kerja (siswa)* ➢ *Lembar penilaian* ➢ *LCD Proyektor/* Slide presentasi (ppt)	**Alat/Bahan** : ➢ Penggaris, spidol, papan tulis ➢ Laptop & infocus

PENDAHULUAN		• Peserta didik memberi salam, berdoa, menyanyikan lagu nasional **(PPK)** • Guru mengecek kehadiran peserta didik dan memberi motivasi (yel-yel/ice breaking) • Guru menyampaikan tujuan dan manfaat pembelajaran tentang topik yang akan diajarkan • Guru menyampaikan garis besar cakupan materi dan langkah pembelajaran
KEGIATAN INTI	**Kegiatan Literasi**	Peserta didik diberi motivasi dan panduan untuk melihat, mengamati, membaca dan menuliskannya kembali. Mereka diberi tayangan dan bahan bacaan terkait materi ***Diagram P-T***
	Critical Thinking	Guru memberikan kesempatan untuk mengidentifikasi sebanyak mungkin hal yang belum dipahami, dimulai dari pertanyaan faktual sampai ke pertanyaan yang bersifat hipotetik. Pertanyaan ini harus tetap berkaitan dengan materi ***Diagram P-T***
	Collaboration	Peserta didik dibentuk dalam beberapa kelompok untuk mendiskusikan, mengumpulkan informasi, mempresentasikan ulang, dan saling bertukar informasi mengenai ***Diagram P-T***
	Communication	Peserta didik mempresentasikan hasil kerja kelompok atau individu secara klasikal, mengemukakan pendapat atas presentasi yang dilakukan kemudian ditanggapi kembali oleh kelompok atau individu yang mempresentasikan
	Creativity	Guru dan peserta didik membuat kesimpulan tentang hal-hal yang telah dipelajari terkait ***Diagram P-T*** Peserta didik kemudian diberi kesempatan untuk menanyakan kembali hal-hal yang belum dipahami
PENUTUP		• Guru bersama peserta didik merefleksikan pengalaman belajar • Guru memberikan penilaian lisan secara acak dan singkat • Guru menyampaikan rencana pembelajaran pada pertemuan berikutnya dan berdoa

C, PENILAIAN

- Sikap : Lembar pengamatan,	- Pengetahuan : LK peserta didik,	- Ketrampilan: Kinerja & observasi diskusi

LESSON PLAN CHEMISTRY

School	**: MA**	**Class/Semester**	**: XII / 1**	**KD**	**: 3.1, 3.2 dan 4.1, 4.2**
Subject	**: KIMIA**	**Time Allocation**	**: 2 x 45 minutes**	**Pertemuan ke**	**: 1**
Material	:	Colligative properties of the solution			

A, OBJECTIVES

- Understanding the use of salt to melt snow.
- Understand the explanation of the colligative properties of solutions using P-T diagrams
- Analyze and conclude the causes of the colligative properties of solutions
- Analyze the difference in the colligative properties of nonelectrolyte solutions and the colligative properties of electrolyte solutions.
- Design experiments on the colligative properties of solutions, for example decreasing the freezing point of nonelectrolyte solutions and electrolyte solutions and report experimental results.
- Conduct experiments on the colligative properties of solutions, such as decreasing the freezing point of nonelectrolyte solutions and electrolyte solutions and report experimental results.
- Determine the degree of ionization of electrolyte substances based on experimental data.
- Complete chemical calculations related to the colligative properties of electrolyte and nonelectrolyte solutions.
- Explain the application of colligative properties in everyday life such as making ice cream, cooking, and preventing radiator water freezing.
- Understand the colligative properties of electrolyte and nonelectrolyte solutions
- Distinguishing colligative properties of electrolyte solutions and nonelectrolyte solutions
- Conducting experiments to determine the degree of ionization
- Analyze experimental data to determine the degree of ionization

B, LEARNING STEPS

Media : ➢ *Worksheet* ➢ *Assessment sheet* ➢ *LCD Proyektor/* Presentation slides (ppt)	**Tools/Materials** : ➢ Ruler, marker, whiteboard ➢ Laptop & infocus

INTRODUCTION		• Students give greetings, pray, sing the national anthem **(PPK)** • Teachers check the attendance of students and give motivation (yel-yel/ice breaking) • The teacher conveys the objectives and benefits of learning about the topic to be taught • The teacher conveys an outline of the scope of the material and learning steps
CORE ACTIVITIES	**Kegiatan Literasi**	Learners are given motivation and guidance to see, observe, read and rewrite them. They were given impressions and reading materials related to ***the P-T Diagram material***
	Critical Thinking	Teachers provide opportunities to identify as many things as possible that are not understood, ranging from factual questions to hypothetical questions. This question should remain related to the ***P-T Diagram material***
	Collaboration	Students are formed in several groups to discuss, collect information, represent, and exchange information about ***the P-T Diagram***
	Communication	Students present the results of group or individual work classically, express opinions on the presentations made and then responded back by the group or individual who presented
	Creativity	Teachers and students make conclusions about things that have been learned related to the ***P-T Diagram*** Students are then given the opportunity to ask back things that have not been understood
CLOSING		• Teachers and students reflect on learning experiences • The teacher gives a random and brief oral assessment • The teacher delivers the lesson plan at the next meeting and prays

C, ASSESSMENT

- Attitude: Observation sheet, observation	- Knowledge: LKS learners,	- Skills: Performance & discussion

RENCANA PELAKSANAAN PEMBELAJARAN (RPP) BIOLOGI

Nama Madrasah	**: MAN [redacted]**	**Mata Pelajaran**	**: Biologi**
Kelas/Semester	**: XI/II**	**Materi**	**: Sistem Respirasi**
Tahun Pelajaran	**: 2022/2023**	**Waktu/Pertemuan**	**: 4 JP/ II**

A. Tujuan Pembelajaran

Setelah pembelajaran peserta didik mampu:

1. Menganalisis kelainan dan penyakit terkait sistem pernapasan.
2. Menjelaskan teknologi penanggulangan kelainan dan penyakit pada sistem pernafasan.
3. Menjelaskan pengaruh merokok dengan kesehatan pernapasan.
4. Menjelaskan hubungan kondisi udara lingkungan yang tidak bersih.
5. Menjelaskan keterkaitan perilaku merokok dengan struktur organ pernapasan.

B. Kompetensi Dasar

Menganalisis hubungan antara struktur jaringan penyusun organ pada sistem respirasi dalam kaitannya dengan bioproses dan gangguan fungsi yang dapat terjadi pada sistem respirasi manusia

C. Indikator

1. Menganalisis kelainan dan penyakit terkait sistem pernapasan.
2. Menjelaskan teknologi penanggulangan kelainan dan penyakit pada sistem pernafasan.
3. Menjelaskan pengaruh merokok dengan kesehatan pernapasan.
4. Menjelaskan hubungan kondisi udara lingkungan yang tidak bersih.
5. Menjelaskan keterkaitan perilaku merokok dengan struktur organ pernapasan.

D. Materi

1. Kelainan atau penyakit yang muncul pada sistem pernafasan.
2. Teknologi penanggulangan penyakit atau kelainan yang muncul pada sistem
3. pernafasan Bahaya merokok.

E. Model/Metode Pembelajaran

Pendekatan : *Saintifict*
Model : *Discovery Learning*
Metode : ceramah, diskusi, tanya jawab

F. Media/Sumber Belajar

Buku pelajaran yang relevan, worksheet, LKPD, Charta, video

G. Langkah –langkah pembelajaran

1. Pendahuluan

a. Mengondisikan suasana belajar yang menyenangkan
b. Mendiskusikan kompetensi yang sudah dipelajari dan dikembangkan sebelumnya
c. Menyampaikan kompetensi yang akan dicapai dan manfaatnya dalam kehidupan sehari-hari.
d. Menyampaikan garis besar cakupan materi dan kegiatan yang akan dilakukan.
e. Menyampaikan lingkup dan teknik penilaian yang akan digunakan.

2. Kegiatan Inti

a. Peserta didik secara individu melakukan observasi (Pengamatan) bungkus rokok yang dibawa oleh guru di depan kelas.
b. Untuk mengenal dan memperdalam konsep, peserta didik secara individu atau kelompok melakukan Kajian Pustaka untuk mendapatkan ilmu/konsep dari materi ***(literasi)***tentang kandungan zat kimia rokok dari buku paket yang ada dan internet.
c. Untuk penguatan materi dari kajian pustaka, guru menampilkan peta konsep penyakit pada sistem pernafasan di depan kelas menggunakan *infocus*.
d. Peserta didik diberikan kasus yang berkaitan dengan materi yang dijelaskan oleh guru dan diminta untuk melakukan Pemecahan masalah/teknologi penanggulangan dari suatu kasus penyakit yang menyerang sistem pernafasan **(*critical thinking*)**.
e. Setelah selesai memecahkan masalah dari kasus tersebut, peserta didik melakukan *Diskusi* dengan temannya sekaligus dipandu oleh guru untuk mengarahkan hasilnya sesuai dengan konsep ***(collaboration)***.
f. Untuk mengevaluasi kemampuan peserta didik, peserta didik diberikan beberapa pertanyaan sesuai materi yang telah disampaikan.
g. Secara acak salah seorang peserta didik ditunjuk untuk mempresentasikan hasil implementasinya di depan kelas sedangkan siswa yang lain menanggapi presentasi dari peserta didik yang tampil tersebut. ***(communication).***

3.Kegiatan Penutup

a. Membuat rangkuman/simpulan pelajaran ***(creativity)***
b. Melakukan refleksi/umpan balik terhadap kegiatan yang sudah dilaksanakan.
c. Menyampaikan materi yang akan dipelajari peserta didik di rumah untuk pertemuan selanjutnya.

H.Penilaian

1. Sikap: observasi, penilaian diri dan penilaian antar teman
2. Pengetahuan: tes tertulis
3. Keterampilan: kinerja, presentasi, fortofolio

I. Remedial dan Pengayaan

1. Remedial

Remedial teaching, tugas kelompok, tutor sebaya, tes tertulis

2. Pengayaan

Pendalaman materi dan tugas mandiri

LESSON PLAN BIOLOGY

Madrasah Name	**: MAN [redacted]**	**Subject**	**: Biologi**
Class/Semester	**: XI/II**	**Material**	**: Respiration System**
Academic Year	**: 2022/2023**	**Time/Meeting**	**: 4 JP/ II**

A. Learning Objectives

After learning learners are able to:

1. Analyze disorders and diseases related to the respiratory system.
2. Explain the technology for controlling disorders and diseases of the respiratory system.
3. Explain the effect of smoking on respiratory health.
4. Explain the relationship between unclean environmental air conditions.
5. Explain the relationship of smoking behavior with the structure of the respiratory organs.

B. Basic Competencies

Analyze the relationship between the structure of organ constituent tissues in the respiratory system in relation to bioprocesses and functional disorders that can occur in the human respiratory system

C. Indicator

1. Analyze respiratory system related disorders and diseases.
2. Explain the technology for controlling disorders and diseases of the respiratory system.
3. Explain the effect of smoking on respiratory health.
4. Explain the relationship between unclean environmental air conditions.
5. Explain the relationship of smoking behavior with the structure of the respiratory organs.

D. Material

1. Abnormalities or diseases that appear in the respiratory system.
2. Technology to overcome diseases or disorders that arise in the respiratory system Dangers of smoking.
3.

E. Model/Learning Methods

Pendekatan : *Saintifict*
Model : *Discovery Learning*
Method : lecture, discussion, question and answer

F. Media/Sumber Belajar

Relevant textbooks, worksheets, LKPD, Charts, videos

G. Learning steps

1. Introduction
a. Condition a pleasant learning atmosphere
b. Discuss competencies that have been previously learned and developed
c. Convey the competencies to be achieved and their benefits in everyday life.
d. Convey an outline of the scope of material and activities to be carried out.
e. Convey the scope and assessment techniques to be used.
2. Core Activities
a. Students individually observe (Observation) packs of cigarettes carried by the teacher in front of the class.
b. To recognize and deepen the concept, students individually or in groups conduct a Literature Review to obtain knowledge/ concepts from the material ***(literacy)*** about the chemical content of cigarettes from existing package books and the internet.
c. To strengthen the material from the literature review, the teacher displays a concept map of diseases of the respiratory system in front of the class using *infocus*.
d. Students are given cases related to the material explained by the teacher and asked to do problem solving / technology to overcome a case of a disease that attacks the respiratory system **(*critical thinking*).**
e. After finishing solving the problem of the case, students conduct discussions with their friends as well as guided by the teacher to direct the results according to the concept ***(collaboration)***.
f. To evaluate the ability of students, students are given several questions according to the material that has been delivered.
g. Randomly one of the students was appointed to present the results of its implementation in front of the class while the other students responded to the presentation of the students who appeared. ***(communication).***
3.Concluding Activities
a. Create lesson summaries/conclusions ***(creativity)***
b. Reflect/feedback on activities that have been carried out.
c. Deliver material that students will learn at home for the next meeting.

H.Penilaian

1. Attitudes: observation, self-assessment and assessment between friends
2. Knowledge: written test
3. Skills: performance, presentation, portfolio

I. Remedial dan Pengayaan

1. Remedial

Remedial teaching, tugas kelompok, tutor sebaya, tes tertulis

Remedial teaching, group assignments, peer tutors, written tests

2. Enrichment

Deepening of the material and independent tasks

MAN [redacted]	RENCANA PROSES PEMBELAJARAN(RPP)		
	Mata Pelajaran	:	FISIKA
	Kelas/Semester	:	XI / GANJIL
	Materi Pokok	:	Dinamika Rotasi dan Keseimbangan Benda Tegar
	Alokasi Waktu	:	4 JP -

PERTEMUAN 1

A. TUJUAN PEMBELAJARAN

- Peserta didik mampu mendefinisikan momen gaya (torsi) melalui pengamatan demonstrasi mendorong benda dengan posisi gaya yang berbeda-beda dengan benar
- Peserta didik mampu menganalisis hubungan gaya dan lengan gaya terhadap besar torsi melalui diskusi kelompok dengan benar
- Peserta Didik mampu menganalis besar momen gaya (torsi) pada berbagai sistem berbeda setelah latihan soal
- Peserta didik dapat melakukan pratikum untuk hubungan gaya dan lengan gaya terhadap torsi

B. MEDIA, ALAT DAN SUMBER BELAJAR

Media	:	Proyektor, LKPD, Lembar Penilaian
Alat/Bahan	:	Gagang pintu, penggaris, spidol, neraca pegas, laptop, infocus
Sumber Belajar	:	• Buku cetak • Internet : https://youtube.com , https://quizizz.com • Lingkungan sekitar (gagang pintu)

C. LANGKAH PEMBELAJARAN

Kegiatan Pendahuluan (45 Menit)

- Melakukan pembukaan dengan salam pembuka dan berdoa untuk memulai pembelajaran, memeriksa kehadiran peserta didik sebagai sikap disiplin
- Menyiapkan fisik dan psikis peserta didik dalam mengawali kegiatan pembelajaran dengan melakukan kegiatan Warming Up/*ice breaking* : *Permainan Touch it* .
- Melakukan Aperpepsi : Meminta peserta didik memberi contoh gerakan yang menghasilkan putaran dalam kehidupan sehari – hari.
- Mengingatkan kembali materi prasyarat dengan bertanya :
  - Apa saja faktor yang menyebabkan benda dapat berputar?
  - Mana yang lebih membutuhkan gaya besar, menggunakan mur yang diputar atau menggunakan palu untuk memukul mur agar menancap didinding?
- Motivasi : Memberikan gambaran tentang manfaat mempelajari tentang torsi perkembangan teknologi seperti jungkat-jungkit, membuka mur roda mobil.
- Menjelaskan hal-hal yang akan dipelajari, kompetensi yang akan dicapai, serta metode belajar yang akan ditempuh.

Kegiatan Inti (90 Menit)

Kegiatan Literasi	• Peserta didik mengakses video melalui link berikut : https://www.youtube.com/watch?v=VvIKMkqVoig , lalu perwakilan peserta didik menceritakan kembali isi video • 2 orang peserta didik dimintabmelakukan ***simulasi*** mendorong gagang Pintu dengan berbagai jarak seperti pada video, sedangkan peserta didik lain melakukan pengamatan • Peserta didik menuliskan resume hasil pengamatan dan berdiskusi mengenai pengaruh gaya dan lengan gaya terhadap putaran pintu • Perwakilan peserta didik membacakan hasil pengamatan dan guru memberikan kesempatan peserta didik lain untuk menanggapi
Critical Thinking	• Peserta didik diberi kesempatan mengajukan dugaan (hipotesis) mengenai bagaimana gaya dan lengan gaya mempengaruhi besar Torsi
Collaboration	• Peserta didik diorganisasikan untuk belajar dalam kelompok kecil untuk melakukan pratikum tentang Pengaruh Gaya dan Lengan Gaya padaTorsi dengan menggunakan LKPD 01
Communication	• Peserta didik mempresentasikan hasil kerja kelompok serta saling memberikan pendapat atas presentasi yang dilakukan kemudian ditanggapi kembali oleh kelompok penyaji
Creativity	• Peserta didik membuat Mind maping Torsi yang memuat tentang hal-hal penting yang telah dipelajari

Kegiatan Penutup (45 Menit)

- Guru mereview kembali materi tentang Torsi dengan meminta peserta didik mengakses kuis menggunakan platform : https://quizizz.com/join?gc=125329&source=liveDashboard (guru melakukan penilaian formatif)
- Guru memberikan umpan balik dan penguatan terhadap soal kuis yang banyak dijawab salah
- Peserta didik dan guru menarik kesimpulan dari hasil kegiatan Pembelajaran.
- Guru Memberikan penghargaan kepada kelompok yang kinerjanya Baik serta peserta didik yang mendapatkan peringkat tertinggi pada kuis .
- Menugaskan Peserta didik untuk terus mencari informasi mengenai penerapan ***hukum II Newton pada gerak rotasi***
- Guru menutup kegiatan pembelajaran dengan mengucapkan salam dan doa.

D. PENILAIAN

1. Penilaian Sikap
   - ✓ Observasi
2. Penilaian Pengetahuan
   - ✓ Tes Tertulis (Pilihan Ganda dan uraian)
3. Penilaian Keterampilan:
   - ✓ Unjuk Kerja Pratikum Torsi

MAN [redacted]	LESSON PLAN (RPP)		
	Subject	:	PHYSICS
	Class/Semester	:	XI / ODD
	Subject matter	:	Dynamics of Rotation and Rigid Body Balance
	Time Allocation	:	4 JP -

MEETING 1

A. LEARNING OBJECTIVES

- Learners are able to define the moment of force (torque) through demonstration observations pushing objects with different force positions correctly
- Learners are able to analyze the relationship of force and force arms to the magnitude of torque through group discussion correctly
- Students are able to analyze the magnitude of the moment of force (torque) in various different systems after practice questions
- Learners can practicum for the relationship of force and arm force to torque

B. MEDIA, TOOLS AND LEARNING

Media	:	Projector, LKPD, Assessment Sheet
Tools/Materials	:	Door handles, rulers, markers, balance springs, laptops, infocus
Learning Resources	:	1. Printed books 2. Internet: https://youtube.com, https://quizizz.com 3. Surroundings (door handles)

C. LEARNING STEPS

Introductory Activity (45 minutes)

- Opening with greetings and praying to start learning, checking the presence of learners as a disciplined attitude
- Prepare physical and psychological students in starting learning activities by doing Warming Up / *ice breaking activities* : *Touch it Game.*
- Perform Aperpepsy: Ask learners to give examples of movements that produce spins in everyday life.
- Remind the prerequisite material by asking:
  1. What are the factors that cause objects to rotate?
  2. Which requires more large force, using a rotated nut or using a hammer to hit the nut to stick into the wall?
- Motivation: Provides an overview of the benefits of learning about the torque of technological developments such as seesaws, opening car wheel nuts.
- Explain the things to be learned, the competencies to be achieved, and the learning methods to be taken.

Core Activities (90 minutes)

Kegiatan Literasi	• Students access the video through the following link: https://www.youtube.com/watch?v=VvIKMkqVoig , then student representatives retell the content of the video • 2 students were asked to ***simulate*** pushing door handles with various distances as in the video, while other students made observations • Students write resumes of observations and discuss the influence of force and force arms on door rotation • Student representatives read out the observations and the teacher gives other students the opportunity to respond
Critical Thinking	• Learners are given the opportunity to propose conjectures (hypotheses) regarding how force and arm force affect the amount of torque
Collaboration	• Learners are organized to study in small groups to do practicum on the Effect of Force and Arm Force on Torque using LKPD 01
Communication	• Students present the results of group work and give opinions to each other on the presentations made then responded back by the presenting group
Creativity	• Students make Mind mapping Torque which contains important things that have been learned

Closing Activities (45 Minutes)

- Teachers review material about Torque by asking students to access quizzes using the platform: https://quizizz.com/join?gc=125329&source=liveDashboard (teachers conduct formative assessments)
- Teachers provide feedback and reinforcement on quiz questions that are answered incorrectly
- Students and teachers draw conclusions from the results of Learning activities.
- Teachers Give awards to groups that perform well as learners who get the highest ratings on quizzes.
- Assign students to constantly seek information regarding the application of Newton's ***second law to rotational motion***
- The teacher closes the learning activity by saying greetings and prayers.

H. ASSESSMENT

1. Attitude Assessment
   - ✓ Observation
2. Knowledge Assessment
   - ✓ Written Test (Multiple Choice and description)
3. Skill Assessment:
   - ✓ Torsion Praticum Performance

RENCANA PELAKSANAAN PEMBELAJARAN

Sekolah	: MAN	Kelas/Semester	: XII / 1	KD	: 3.1 dan 4.1
Mata Pelajaran	: FISIKA	Alokasi Waktu	: 2 x 45 menit	Pertemuan ke	: 1
Materi	:	Rangkaian arus searah			

A, TUJUAN

- Memahami arus listrik dan pengukurannya
- Memahami Hukum Ohm
- Menjelaskan arus listrik dalam rangkaian tertutup
- Menganalisis hambatan sepotong kawat penghantar
- Menganalisis rangkaian hambatan
- Menganalisis gabungan sumber tegangan listrik
- Memahami Hukum II Kirchoff
- Menganalisis energi dan daya listrik
- Menganalisis prinsip kerja peralatan listrik searah (DC) dalam kehidupan sehari-hari
- Membuat percobaan tentang rangkaian listrik searah
- Menyajikan hasil percobaan tentang rangkaian listrik searah baik lisan maupun tulisan secara sistematis

B, LANGKAH-LANGKAH PEMBELAJARAN

Media :	Alat/Bahan :
➢ *Worksheet atau lembar kerja (siswa)* ➢ *Lembar penilaian* ➢ *LCD Proyektor/* Slide presentasi (ppt)	➢ Penggaris, spidol, papan tulis ➢ Laptop & infocus

PENDAHULUAN		• Peserta didik memberi salam, berdoa, menyanyikan lagu nasional **(PPK)** • Guru mengecek kehadiran peserta didik dan memberi motivasi (yel-yel/ice breaking) • Guru menyampaikan tujuan dan manfaat pembelajaran tentang topik yang akan diajarkan • Guru menyampaikan garis besar cakupan materi dan langkah pembelajaran
KEGIATAN INTI	**Kegiatan Literasi**	Peserta didik diberi motivasi dan panduan untuk melihat, mengamati, membaca dan menuliskannya kembali. Mereka diberi tayangan dan bahan bacaan terkait materi ***Arus listrik dan pengukurannya***
	Critical Thinking	Guru memberikan kesempatan untuk mengidentifikasi sebanyak mungkin hal yang belum dipahami, dimulai dari pertanyaan faktual sampai ke pertanyaan yang bersifat hipotetik. Pertanyaan ini harus tetap berkaitan dengan materi ***Arus listrik dan pengukurannya***
	Collaboration	Peserta didik dibentuk dalam beberapa kelompok untuk mendiskusikan, mengumpulkan informasi, mempresentasikan ulang, dan saling bertukar informasi mengenai ***Arus listrik dan pengukurannya***
	Communication	Peserta didik mempresentasikan hasil kerja kelompok atau individu secara klasikal, mengemukakan pendapat atas presentasi yang dilakukan kemudian ditanggapi kembali oleh kelompok atau individu yang mempresentasikan
	Creativity	Guru dan peserta didik membuat kesimpulan tentang hal-hal yang telah dipelajari terkait ***Arus listrik dan pengukurannya*** Peserta didik kemudian diberi kesempatan untuk menanyakan kembali hal-hal yang belum dipahami
PENUTUP		• Guru bersama peserta didik merefleksikan pengalaman belajar • Guru memberikan penilaian lisan secara acak dan singkat • Guru menyampaikan rencana pembelajaran pada pertemuan berikutnya dan berdoa

C, PENILAIAN

- Sikap : Lembar pengamatan, - Pengetahuan : LK peserta didik, - Keterampilan: Kinerja & observasi diskusi

LESSON PLAN

School	: MAN	Class/Semester	: XII / 1	KD	: 3.1 and 4.1
Subject	: PHYSICS	Time Allocation	: 2 x 45 menit	Meeting to: 1	
Material	: | Direct current circuit				

A, PURPOSE

- Understand electric current and its measurement
- Understanding Ohm's Law
- Describe electric current in a closed circuit
- Analyze the resistance of a piece of conducting wire
- Analyzing chain constraints
- Analyzing combined voltage sources •
Understand Kirchoff's II Law
- Analyze energy and power
- Analyze the working principle of direct current (DC) electrical equipment in everyday life
- Make experiments on one-way electric circuits
- Presenting experimental results on one-way electric circuits both orally and in writing systematically

B, LEARNING STEPS

Media :	Tools/Materials:
➤ Worksheet or worksheet (student) ➤ Assessment sheet ➤ LCD Projector/ Presentation slides (ppt)	➤ Ruler, marker, whiteboard ➤ Laptops & infocus

INTRODUCTION		• Students greet, pray, sing the national anthem (PPK) • The teacher checks the attendance of students and gives motivation (yell-yells/ice breaking) • The teacher conveys the objectives and benefits of learning about the topic to be taught. • The teacher conveys an outline of the scope of the material and learning steps
CORE ACTIVITIES	Literacy Activities	Students are given motivation and guidance to see, observe, read and rewrite it. They were given displays and reading materials related to electric current and its measurements
	Critical Thinking	The teacher provides the opportunity to identify as many things as possible that are not understood, starting from factual questions to hypothetical questions. This question must still be related to the material Electric current and
	Collaboration	its measurement Students are formed in several groups to discuss, collect information, present again, and exchange information about Electric current and measurement
	Communication	Students present the results of group or individual work classically express opinions on the presentations made and then respond back by the group or individual presenting
	Creativity	Teachers and students make conclusions about the things that have been learned related to electric current and its measurements Students are then given the opportunity to ask questions again about things that have not been understood
CLOSING		• Teachers and students reflect on learning experiences • The teacher gives random and brief oral assessments • The teacher conveys the lesson plan at the next meeting and prays

C. EVALUATION

- Attitude: Observation sheet, -Knowledge: LK learners, - Skills: Performance & discussion observation

Appendix 7 Student's worksheet

Lampiran 1 – LKPD 01

MAN [redacted]	**LEMBAR KERJA SISWA**	Nama		
	Materi : **Torsi (Momen Gaya)**	Kelas		
		Mata Pelajaran		
		Hari/Tanggal		

Kompetensi Dasar :

3.1 Menerapkan konsep Torsi (Momen Gaya), momen inersia, titik berat, dan momentum sudut pada benda tegar (statis dan dinamis) dalam kehidupan sehari-hari misalnya dalam olahraga

4.1 Membuat karya yang menerapkan konsep titik berat dan kesetimbangan benda tegar

Indikator :

- Mendefinisikan momen gaya (Torsi (Momen Gaya)) melalui pengamatan demonstrasi mendorong benda dengan posisi gaya yang berbeda-beda
- Peserta didik dapat melakukan pratikum untuk hubungan gaya dan lengan gaya terhadap torsi
- Menentukan besar momen gaya /Torsi pada suatu sistem gaya

Diskusikan pertanyaan berikut dengan teman sekelompokmu

Tabel Besaran dan Satuan pada materi <u>Torsi (Momen Gaya) dan Keseimbangan Benda Tegar</u>

Besaran	Pengertian	Satuan (dalam SI)
Torsi (Momen Gaya)		
Gaya		
Lengan Gaya		
Kecepatan Sudut		
Percepatan sudut		

PRATIKUM TORSI DAUN PINTU

Tujuan :

Alat dan Bahan :

1. Pintu ruangan
2. Neraca pegas
3. Benang
4. Penggaris
5. selotipe

Prosedur :

1. Carilah pintu ruangan
2. Hubungkan benang menggunakanneraca pegas dan baca gaya yang dibutuhkan untuk menarik pintu agar berputar pada 5 posisi berbeda
3. Ubah variable pengukuran dengan gaya yang berbeda – beda
4. Beri kesimpulan

Hasil percobaan

A. Hubungan Lengan gaya dan Torsi

No	Lengan Gaya (d) Jarak Benang ke Engsel Pintu	Gaya (F) (pembacaan Neraca pegas)
1	**0 cm**	
2	**10 cm**	
3	**15 cm**	
4	**20 cm**	
5	**60 cm**	

B. Hubungan Lengan gaya dan Torsi

No	Lengan Gaya (d) Jarak Benang ke Engsel Pintu	Gaya (F) (pembacaan Neraca pegas)	Pengamatan
1	40 m	1,5 N	
2		3 N	

KESIMPULAN

.....
.....

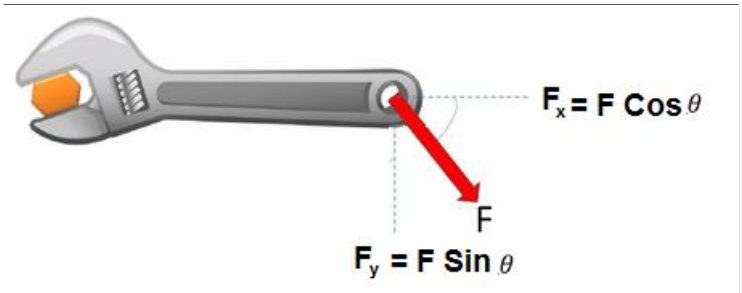
Sehingga secara umum dapat dirumuskan :

ket :

_____
_____

BAGAIMANA JIKA GAYA YANG DIBERIKAN MEMBENTUK SUDUT Θ TERHADAP GARIS POROS? UNTUK MEMAHAMINYA, PERHATIKAN GAMBAR DI BAWAH INI!

1. Berdasarkan gambar di atas, jika kunci inggris diberi gaya F yang membentuk sudut, kemanakah arah perputaran sekrup?_____
2. F_x atau F_y Kah yang menyebabkan putaran? _____

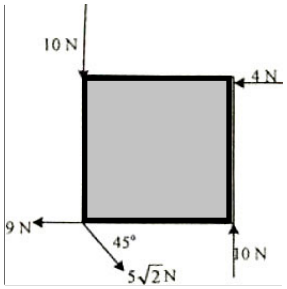


persamaan momen gaya (torsi) menjadi:

Perjanjian tanda :
Torsi bernilai (+) = jika putaran searah jarum jam
Torsi bernilai (-) = jika putaran berlawananjarum jam

PENERAPAN RUMUS TORSI (MOMEN GAYA)

1. (**UN FISIKA 2018)**
   Lima gaya bekerja pada bujur sangkar dengan sisi 10 cm seperti ditunjukkan pada gambar !
   Resultan momen gaya dengan poros di titik perpotongan diagonal bujur sangkar adalah ….
   A. 0,15 N.m
   B. 0,25 N.m
   C. 0,75 N.m
   D. 1,15 N.m
   E. 1,25 N.m



Lampiran 2 – Teknik Penilaian

1. Penilaian Sikap

Lembar Observasi berupa jurnal sikap dengan format sebagai berikut :

Nama Sekolah : .....

Mata Pelajaran : .....

Kelas/Semester : .....

No	Hari/tanggal	Nama siswa	Sikap yang diamati Spiritual / sosial	Butir Sikap dan Catatan Perilaku	Tindak Lanjut

SIKAP SPIRITUAL

1. Berdoa sebelum dan sesudah melakukan kegiatan.
2. Menjalankan ibadah sesuai dengan agamanya.
3. Memberi salam pada saat awal dan akhir kegiatan.
4. Bersyukur atas nikmat dan karunia Tuhan Yang Maha Esa.
5. Mensyukuri kemampuan manusia dalam mengendalikan diri.
6. Bersyukur ketika berhasil mengerjakan sesuatu.
7. Berserah diri (tawakal) kepada Tuhan setelah berusaha.
8. Memelihara hubungan baik sesama umat ciptaan Tuhan Yang Maha Esa.
9. Bersyukur kepada Tuhan Yang Maha Esa sebagai bangsa Indonesia.
10. Menghormati orang lain yang menjalankan ibadah sesuai agamanya

SIKAP SOSIAL

1. Jujur
2. Disiplin
3. Tanggung jawab
4. Santun
5. Percaya diri
6. Peduli
7. Toleransi

2. Penilaian Keterampilan

Penilaian unjuk kerja Pratikum Torsi

No	Nama Siswa	Mempersiapkan alat dan bahan	Pelaksanaan	Pengolahan data	Penarikan kesimpulam	Jumlah	Niilai
1							
2							
3							
4							

Kriteria penilaian (skor)

4 = Sangat Baik

3 = Baik

2 = Kurang Baik

1 = Tidak Baik'

Nilai $= \frac{jumlah\ poin}{4}\ x\ 100$

Translation

Lampiran 1 – LKPD 01

MAN [redacted]	**STUDENT WORKSHEET** Material : **Torque (Moment of Force)**	Name		
		Class		
		Subject		
		Day/date		

Basic competency :

3.1 Apply the concepts of Torque (Moment of Force), moment of inertia, point of gravity, and angular momentum to rigid objects (static and dynamic) in everyday life for example in sports

4.1 Create works that apply the concepts of weight and equilibrium of rigid bodies

Indicator :

- Defining the moment of force (Torque (Moment of Force)) through the observation of demonstrations pushing objects with different positions of force
- Learners can practicum for the relationship of force and arm force to torque
- Determining the magnitude of the moment of force / Torque in a force system

Discuss the following questions with your group mates

Table of Quantities and Units on Torque (Moment of Force) and Rigid Body Balance

Massive	Pengertian	Satuan (dalam SI)
Torque (Style Moment)		
Style		
Arm Style		
Angular velocity		
Angular acceleration		

DOOR TORSION PRATICUM

Purpose :

Tools and Materials :

1. Room door
1. Spring balance
2. Thread
3. Ruler
4. Elotype

Procedure :

1. Look for the door of the room
2. Connect the threads using a spring balance and read the force required to pull the door to rotate in 5 different positions
3. Change the measurement variable with different styles
4. Conclude

Experimental results

A. Arm Force and Torque Relationship

No	Arm Style (d) Thread to Door Hinge Distance	Style (F) (Spring Balance reading)
1	**0 cm**	
2	**10 cm**	
3	**15 cm**	
4	**20 cm**	
5	**60 cm**	

B. Arm Force and Torque Relationship

No	Arm Style (d) Thread to Door Hinge Distance	Style (F) (Spring Balance reading)	Observation
1	40 m	1,5 N	
2		3 N	

CONCLUSION

.....
.....
.....
.....
.....

So that in general it can be formulated:

ket :

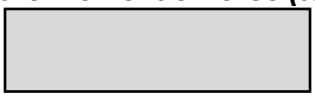
_____
_____
_____

WHAT IF THE APPLIED FORCE FORMS AN ANGLE Θ WITH RESPECT TO THE AXIS LINE? TO UNDERSTAND IT, PAY ATTENTION TO THE PICTURE BELOW!

3. Based on the picture above, if the wrench is given an F force that forms an angle, where is the direction of rotation of the screw?_____

4. F_x or F_y that causes rotation? _____

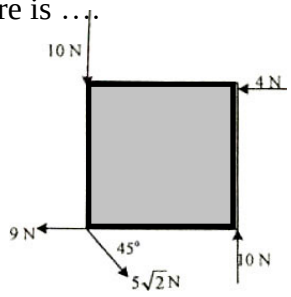
The equation of the moment of force (torque) becomes:



Agreement sign:
Torque is valued (+) = if rotation is clockwise
Torque is valued (-) = if revolution counterclockwise

APPLICATION OF TORQUE FORMULA (MOMENT OF FORCE)

2. (**UN FISIKA 2018)**
Five forces work on a square with sides of 10 cm as shown in the figure! The resultant moment of force with the shaft at the point of intersection of the diagonal of the square is ….
A. 0,15 N.m
B. 0,25 N.m
C. 0,75 N.m
D. 1,15 N.m
E. 1,25 N.m



1. **Attitude Assessment**

Observation Sheet in the form of an attitude journal with the following format :

School Name : .....

Subject : .....

Class/Semester : .....

No	Hari/tanggal	Student name	Observed attitudes Spiritual / social	Attitude Items and Behavioral Notes	Follow-up

SPIRITUAL ATTITUDE

1. Pray before and after doing activities.
2. Carry out worship in accordance with his religion.
3. Say salam at the beginning and end of the activity.
4. Grateful for the blessings and gifts of God Almighty.
5. Be grateful for the human ability to control themselves.
6. Be grateful when you succeed in doing something.
7. Surrender (tawakal) to God after trying.
8. Preserve good relations among the people of the creation of the One God.
9. Thank God Almighty as an Indonesian.
10. Respect others who perform worship according to their religion

SOCIAL ATTITUDES

1. Be honest
2. Discipline
3. Responsibility
4. Polite
5. Self-confidence
6. Care
7. Tolerance

2. **Skill Assessment**

Torsion Praticum performance assessment

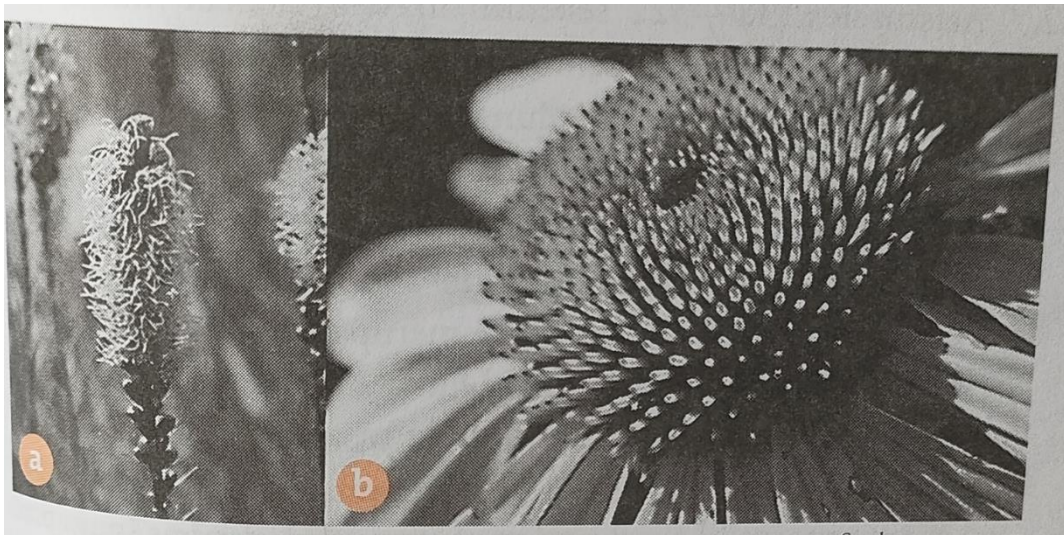
No	Student Name	Preparing tools and materials	Implementation	Data processing	Conclusion withdrawal	Total	Value
1							
2							
3							
4							

Assessment criteria (score)

4 = Excellent
3 = Good
2 = Less Good
1 = Not Good'

Nilai $= \frac{jumlah\ poin}{4}\ x\ 100$

Appendix 8 Biology book about evolution theory



Sumber: *www.cnx.org*

Gambar 8.4 Contoh evolusi divergen terjadi pada (a) *Liatris spicata* dan (b) *Echinacea purpurea*. Keduanya memiliki dasar morfologi yang sama karena memiliki satu nenek moyang.

II. Teori Evolusi

Pada mulanya, evolusi merupakan dugaan atau hipotesis dari sebagian kecil orang. Namun, kemudian banyak ahli yang tertantang untuk membahas dan membuktikannya. Sejak ditemukan fosil bermacam-macam makhluk hidup yang kemudian dianggap sebagai bukti evolusi, hipotesis tentang evolusi tersebut berkembang menjadi teori-teori evolusi. Banyak ahli, terutama ahli biologi, yang memberikan penjelasan dan mengembangkan pemikiran tentang evolusi pada masa sebelum teori evolusi Darwin maupun sesudahnya. Hingga saat ini, masalah evolusi masih merupakan misteri yang akan terus diungkap, dikaji, dan dibuktikan kebenarannya.

Beberapa ahli yang telah mengemukakan dan mengembangkan pemikiran tentang evolusi, antara lain Plato, Aristoteles, Copernicus dan Galileo, Pierre-Louis Moreau de Maupertuis, Denis Diderot, Georges Louis Leclerc, Comte de Buffon, Erasmus Darwin (kakek Charles Robert Darwin), Jean Baptiste Lamarck, August Weismann, Baron Georges Cuvier, James Hutton, Charles Lyell, dan Charles Robert Darwin.

Source: Irnaningtyas. (2018). *Biologi untuk SMA/MA kelas XII*. Erlangga.

Appendix 9 Prehistoric human site preservation center file about evolution theory

https://kebudayaan.kemdikbud.go.id/bpsmpsangiran/wp-content/uploads/sites/11/2017/11/1.-Charles-Darwin-Sa...

Draw | Read aloud | 2 of 2

yang segera dipertanyakan dan dicari.

Kontroversi Teori Darwin

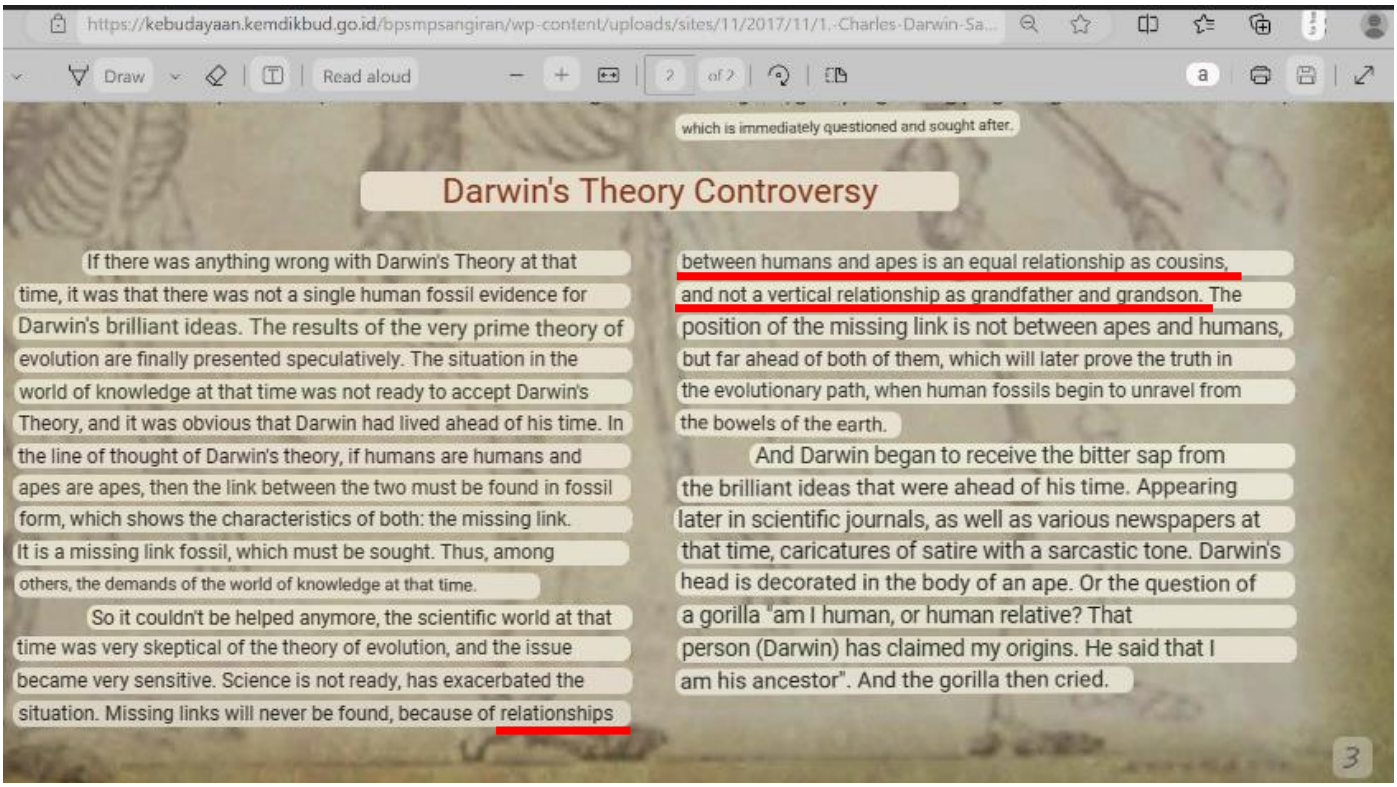
Jika terdapat sesuatu yang salah akan Teori Darwin saat itu, maka itu adalah tidak adanya satu pun bukti fosil manusia bagi ide-ide cemerlang Darwin. Hasil pemikiran teori evolusi yang sangat prima tersebut akhirnya disajikan secara spekulatif. Situasi dunia pengetahuan saat itu belum siap menerima Teori Darwin, dan nyata sekali bahwa Darwin telah hidup mendahului jamannya. Dalam jalur pemikiran Teori Darwin, seandainya manusia adalah manusia, kera adalah kera, maka pertalian antara keduanya harus dapat ditemukan dalam bentuk fosil, yang menunjukkan ciri-ciri keduanya: *missing link*. Itu adalah fosil penghubung yang hilang, yang harus dicari. Demikian antara lain tuntutan dunia pengetahuan saat itu.

Maka tidak dapat dicegah lagi, dunia ilmiah saat itu sangat skeptis terhadap teori evolusi, dan persoalan itu menjadi demikian sensitif. Ilmu pengetahuan yang belum siap, telah memperburuk situasi. *Missing link* tidak akan pernah ditemukan, karena hubungan antara manusia dan kera adalah hubungan sejajar sebagai dua sepupu, dan bukan hubungan vertikal sebagai kakek dan cucu. Posisi *missing link* bukan berada antara kera dan manusia, tetapi jauh mendahului keduanya, yang kelak di kemudian hari akan terbukti kebenarannya dalam jalur evolusi, ketika fosil-fosil manusia mulai terkuak dari perut bumi.

Dan Darwin pun mulai menerima getah pahit dari ide-ide cemerlang yang mendahului jamannya. Muncul kemudian dalam jurnal-jurnal ilmiah, dan juga berbagai surat kabar saat itu, karikatur-karikatur sindiran bernada sarkastis. Kepala Darwin dihiaskan dalam tubuh seekor kera. Atau pertanyaan dari seekor gorilla *"apakah saya manusia , atau saudara manusia? Orang itu (Darwin) telah mengklaim asal usul saya. Dia bilang bahwa saya adalah nenek moyangnya"*. Dan gorilla pun kemudian menangis.

3

Translation



https://kebudayaan.kemdikbud.go.id/bpsmpsangiran/wp-content/uploads/sites/11/2017/11/1.-Charles-Darwin-Sa...

Draw | Read aloud | 2 of 2

which is immediately questioned and sought after.

Darwin's Theory Controversy

If there was anything wrong with Darwin's Theory at that time, it was that there was not a single human fossil evidence for Darwin's brilliant ideas. The results of the very prime theory of evolution are finally presented speculatively. The situation in the world of knowledge at that time was not ready to accept Darwin's Theory, and it was obvious that Darwin had lived ahead of his time. In the line of thought of Darwin's theory, if humans are humans and apes are apes, then the link between the two must be found in fossil form, which shows the characteristics of both: the missing link. It is a missing link fossil, which must be sought. Thus, among others, the demands of the world of knowledge at that time.

So it couldn't be helped anymore, the scientific world at that time was very skeptical of the theory of evolution, and the issue became very sensitive. Science is not ready, has exacerbated the situation. Missing links will never be found, because of relationships between humans and apes is an equal relationship as cousins, and not a vertical relationship as grandfather and grandson. The position of the missing link is not between apes and humans, but far ahead of both of them, which will later prove the truth in the evolutionary path, when human fossils begin to unravel from the bowels of the earth.

And Darwin began to receive the bitter sap from the brilliant ideas that were ahead of his time. Appearing later in scientific journals, as well as various newspapers at that time, caricatures of satire with a sarcastic tone. Darwin's head is decorated in the body of an ape. Or the question of a gorilla "am I human, or human relative? That person (Darwin) has claimed my origins. He said that I am his ancestor". And the gorilla then cried.

3

Source: https://kebudayaan.kemdikbud.go.id/bpsmpsangiran/wp-content/uploads/sites/11/2017/11/1.-Charles-Darwin-Sang-Pencetus-Teori-Evolusi.pdf

Appendix 10 School acceptance letter of research permit

KEMENTERIAN AGAMA REPUBLIK INDONESIA
KANTOR KEMENTERIAN AGAMA

Nomor : B- 318/Ma.04.19/PP.00.6/05/2023 , 16 Mei 2023
Hal : Balasan Izin Permohonan Penelitian

Kepada Yth.
Kepala Dinas Penanaman Modal
dan pelayanan terpadu Satu Pintu
di
Tempat

Dengan hormat,

Menanggapi surat rekomendasi dari Kepala Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Riau, Nomor: 503/DPMPTSP/NON IZIN-RISET/56132, maka dengan ini kami memberikan izin untuk melakukan penelitian di Madrasah Aliyah Negeri kepada mahasiswa:

Nama	: Nur Atika
NIM	: 04242110017
Program Studi	: Magister Ilmu Pendidikan
Konsentrasi	: -
Jenjang	: S2
Judul Penelitian	: Investigating Teacher's Approach to Science Subjectsin Indonesian Religious-Based Schools: A Case Study

Demikian surat ini kami sampaikan, atas kerjasamanya kami ucapkan terimakasih.

Kepala Madrasah

Appendix 11 Documentation

Interviews with Biology teacher

Interview with Chemistry teacher

Interview with physics teacher

Researcher's photo in front of learning classroom building

Researcher's photo in front of laboratory building

Interviews with Science 2 student

Interview with Science 1 student

Appendix 12 data analysis process of coding using Quirkos