

Philosophy of Advanced Science "Ethics and Morals in Science"

Muhammad Zaki Rahman, Ahmad Syukri SS, Zarfina Yenti
Universitas Islam Negeri Sulthan Thaha Saifuddin Jambi, Indonesia
Email: muhmmdzaki94@gmail.com, ahmadsyukriss@uinjambi.ac.id,
zarfinayenti@uinjambi.ac.id

KEYWORDS	ABSTRACT
Ethics; Moral; Science;	Ethics and morals in science are essential dimensions that ensure the pursuit of knowledge contributes positively to human welfare while minimizing potential harm. The increasing complexity of scientific research requires clear ethical frameworks and moral guidance to maintain accountability and social responsibility. The objective of this study is to analyze the meaning of ethics and morals in science, explore their classifications, examine the relevance of utilitarian ethics, and discuss their application in both scientific and humanistic contexts. The research employed a qualitative descriptive method through a literature review, analyzing relevant philosophical and scientific sources to build a conceptual framework. The findings indicate that ethics in science serves as a normative guide to regulate scientific conduct, whereas morals emphasize intrinsic values of good and bad in scientific practice. Utilitarianism provides a foundation for evaluating scientific outcomes based on the greatest benefit for the greatest number, which remains relevant in modern scientific and humanitarian discourse. The implications of this study highlight the need to integrate ethical and moral education into scientific training to ensure that research outputs are not only innovative but also socially responsible, thereby fostering a culture of integrity and accountability in the scientific community.
Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)	
	

Introduction

Ethics and morals are two important aspects of the world of science that play a key role in guiding human behavior. The rapid development of science has brought tremendous progress to mankind. However, this progress cannot be separated from the potential ethical and moral dilemmas that accompany it (Aburaera et al., 2013). Such a powerful science can be misused for detrimental purposes, while science without a moral foundation can lose its direction and have a negative impact. Ethics and morality in science are inseparable (Pratiwi et al., 2022; Mill, 2020). Ethics and morals are fundamental aspects of the scientific world that guide human behavior and form the foundation for the responsible development of knowledge and applications that benefit society (A. Susanto, 2011; Bakhtiar, 2012). The relationship between ethics and science is like two sides of a coin that cannot be separated (Fensi, 2020). When studied naturally, human ethics and science essentially originate from religion, and religion originates from God. As a challenge in this

Journal of Indonesian Social Sciences, Vol. 6, No. 9, September 2025 2855

global era, it is important to explore how to integrate ethics and science so that a synergistic, systematic, and functional relationship is realized for all (Asrulla et al., 2019).

Science, in general, continuously develops over time. Research activities and the efforts of scientists drive this progress. The development and application of science affect behavioral patterns and social phenomena (Hastiadi et al., 2019; Jumrah, 2022; Hambali et al., 2021). Therefore, the process of developing and applying science must consider the values of good and bad that stem from morality, not just right and wrong based on logic, so that the use of science continues to have a positive impact and benefit society (Jumrah, 2022). Ethics in science is an important area of study to ensure that scientific practice is based not only on truth and objectivity but also on moral values that can benefit humanity (Kusumohamadjojo, 2013). In this context, ethics serves as a guide to assist scientists in conducting research and applying science responsibly and fairly.

While much of the existing discourse on ethics and morality in science underscores their philosophical distinctions, empirical investigations often emphasize either descriptive frameworks or domain-specific applications without bridging theoretical and educational needs (Ipel, 2017). For instance, Chaddha (2023) offers a philosophical overview delineating how ethics and morality—while related—serve different functions: ethics provides organized systems of guidelines, whereas morality reflects subjective values (Chaddha, 2023). Meanwhile, Lymbouridou's (2025) study in science education highlights how students use scientific claims to support moral-practical judgments—consequence-based, means-end, and deontological reasoning—but stops short of addressing deeper moral integration or pedagogical frameworks for scientists (Lymbouridou, 2025). These studies contribute significantly yet leave open two key gaps: the lack of an integrated framework linking ethics, moral philosophy—particularly utilitarianism—and science education, and the absence of empirical guidance on how to embed ethical and moral understanding into the behavior of scientific practitioners (Sjarkawi, 2011; Syafrizal, 2017; Yusuf, 2016). Addressing these deficiencies, the present study develops a holistic model that intertwines ethical theory (especially utilitarian ethics), moral reasoning, and educational strategies to foster responsible scientific conduct (Basar et al., 2024; Syam et al., 2025).

Through qualitative analysis, literature synthesis, and philosophical integration, this research contributes a robust conceptual foundation to guide both ethical training and moral reflection in science careers. Its objective is to delineate and operationalize a comprehensive ethics-and-morals framework for science professionals. Its significance lies in informing curriculum design and professional development initiatives to ensure that scientific progress remains grounded in values that benefit society and uphold integrity.

Materials and Method

This study used a literature review approach. A literature review is an effort made by observers or researchers to collect all information that is appropriate and relevant to the problem or topic that was or is being researched. The information in question could be obtained from scientific books, the results of other people's research, research reports, encyclopedias, facts, yearbooks, and written or electronic sources. The theories underlying the problem in the field that was or wanted to be researched could be found by conducting a literature review. The method of

collecting sources in this study involved literature reviews of books, scientific articles published online, and research related to Ethics and Morals in Science.

Results and Discussions

Ethics

The word ethics comes from the word ethos (Greek) which means character, moral character or custom. While the Latin word ethics comes from the word "ethnic" which means habit. In terms of language, ethics is a science that talks about the problem of human actions or behavior, which can be judged good and which is not good. Ethics is also interpreted as a theory about the behavior of human actions seen in terms of good and bad. In the dictionary book Educational and General Terms, it is stated that ethics is a part of philosophy that teaches about the nobility of the mind (good and bad). Ethics is very much needed in human behavior, because ethics are used to assess existing value systems such as judging whether it is good or bad and in accordance with norms or not.

The definition of ethics in terms of terms has been put forward by experts with different expressions according to their respective perspectives. According to Zainudin Ali, ethics is behavior that produces good deeds that are commendable by reason and syara. From some of the definitions above, it can be concluded that ethics is a science that is related to efforts to determine the actions that humans do to be said to be good or bad. Then according to Austin Fagothey, Ethics is the study of human will, which is the will that is related to decisions about right and wrong in the form of human actions. Ethics seeks and seeks to humanely demonstrate the values of a true life to each person. Meanwhile, according to Proverbs Bakhtiar, he interprets ethics in two meanings, namely ethics as a collection of knowledge about the assessment of human actions and ethics as a predicate used to distinguish between other things, deeds, or human beings.

Ethics according to philosophy is a science that discusses good and bad by paying attention to the deeds of human deeds as far as the mind can know. Ethics is one of the branches of philosophy that studies human behavior. So, ethics is an institution of behavior of a person or group of people that is composed of a value system or norm taken from the natural symptoms of that group of society.

It can be concluded that the definition of ethics contains indicators, namely the study of human behavior and moral values, can refer to a set of value or moral systems, including duties or obligations and standards of behavior of individuals, groups, and professions. Ethical teachings are guided by the goodness of an act which can be seen from its contribution to creating the goodness of the lives of fellow humans, the good and bad behavior of a person can be seen based on the amount of the person providing benefits to others.

Ethics is also a branch of axiology that questions the predicate of good or bad in the sense of morality, or immorality. As a special problem, ethics also question the qualities that make a person entitled to be called moral or wise. These qualities are called "virtues" and "badness"

Moral

The word moral comes from the Latin word "Mos" (Moris) which means customs, customs, rules or values in life. Morals are used to show good or bad behavior and manners that are in accordance with applicable values or regulations. In addition, morals are used to describe personalities such as discipline, responsibility, trust, and keeping promises. Morality is basically any form of assessment of character, behavior, and deeds related to applicable rules.

Experts define morality as follows. Helden and Richards say that moral sense is a sensitivity for each individual in thoughts, feelings, and actions regarding the existence of rules that apply in the environment. Furthermore, Atkinson explained that morality is the view of behavior about good or bad, right or wrong, what can or cannot be done. So, morality is the values that are used as a handle by individuals to regulate their behavior. Then Muhammad Asrori also conveyed this in his work that morality is an order of behavior that contains certain values for individuals to do in relation to other individuals or groups of society. Meanwhile, morality is also said to be a reflection of a person's values and ideals. According to him, morality contains cognitive, affective and behavioral aspects.

Morals are seen as the teachings, teachings, sermons and standards of how man should live and become a good man through how he acts. Some of those who are the source of moral teachings can be through religion, the advice of teachers, wise men, parents, and so on. So that the source of moral teachings can be in the form of religions, customs, traditions, and certain beliefs.

Based on its understanding, morality has characteristics, namely: a) The act has been ingrained and personalized, b) The act is done easily and without the need for more thought, c) The act is done by one's own will and choice, d) The act is done in truth, not pretended and e) The act is done on the basis of intention to Allah SWT.

Based on the above understanding, it can be understood that morality is a term used to provide limits on human activities with good or bad values, right or wrong. If in daily life, a person is said to be moral if he has good behavior.

The discussion of the various ethics based on their type, scope, environment, and sources is as follows:

Moral

The word moral comes from the Latin word "Mos" (Moris) which means customs, customs, rules or values in life. Morals are used to show good or bad behavior and manners that are in accordance with applicable values or regulations. In addition, morals are used to describe personalities such as discipline, responsibility, trust, and keeping promises. Morality is basically any form of assessment of character, behavior, and deeds related to applicable rules.

Experts define morality as follows. Helden and Richards say that moral sense is a sensitivity for each individual in thoughts, feelings, and actions regarding the existence of rules that apply in the environment. Furthermore, Atkinson explained that morality is the view of behavior about good or bad, right or wrong, what can or cannot be done. So it can be said that morality is the values that are used as a handle by individuals to regulate their behavior. Then Muhammad Asrori also conveyed this in his work that morality is an order of behavior that contains certain values for individuals to do in relation to other individuals or groups of society. Meanwhile, morality is also said to be a reflection of a person's values and ideals. According to him, morality contains cognitive, affective and behavioral aspects.

Morals are seen as the teachings, teachings, sermons and standards of how man should live and become a good man through how he acts. Some of those who are the source of moral teachings can be through religion, the advice of teachers, wise men, parents, and so on. So that the source of moral teachings can be in the form of religions, customs, traditions, and certain beliefs.

Based on its understanding, morality has characteristics, namely: a) The act has been ingrained and personalized, b) The act is done easily and without the need for more thought, c) The act is done by one's own will and choice, d) The act is done in truth, not pretended and e) The act is done on the basis of intention to Allah SWT.

Based on the above understanding, it can be understood that morality is a term used to provide limits on human activities with good or bad values, right or wrong. If in daily life, a person is said to be moral if he has good behavior.

The discussion of the various ethics based on their type, scope, environment, and sources is as follows:

Descriptive ethics, which is an effort to assess actions or behaviors based on the provisions or norms of good and bad that grow in common life in society. The ethical framework essentially places the habits that already exist in society as an ethical reference. A person's action is called ethical or does not depend on its suitability that each person does. Descriptive ethics describe moral behavior in a broad sense such as, customs, notions of good and bad, permissible or impermissible behaviors.

Nowadays, descriptive ethics is carried out by social sciences, cultural anthropology, psychology, sociology, history, and so on. The famous studies of the development of moral consciousness in the life of a human being by the Swiss psychologist Jean Piaget (1896-1980) and the American psychologist Lawrence Kohlberg (1927-1988) are good examples of descriptive ethics.

Normative ethics is a type of ethics that seeks to determine and establish various behaviors, deeds, and ideal attitudes that should be possessed by each individual. Ethics stipulates that humans use norms as their role models, but do not provide a response to the feasibility of moral measures. Whether or not the norms are valid remains unquestioned, which is only considered to be enforceable. Normative ethics pays attention to reality, which is not captured and empirically verified. Normative ethics seeks to examine and assess whether an ethical action is ethical or not, depending on its conformity to the norms that have been carried out in a society. The reference norms used to assess actions can be in the form of discipline, and also professional codes of ethics. Thus, normative ethics aims to formulate ethical principles that can be accounted for in the practice of daily life. Based on the scope contained in it, normative ethics is divided into two, namely:

1. General ethics is an ethics that discusses general themes, such as ethical norms, moral values, responsibilities, and human rights and obligations.
2. Special ethics, which is the application of general ethical principles to a specific area of human behavior. Such as, environmental ethics, educational ethics, medical ethics, technological ethics, and so on.

Then Aristotle also divided ethics, namely individual and social ethics. In individual ethics, the purpose of human life is happiness in the form of perfection and goodness. The way to get there is the exercise of virtue and obligation. Individual ethics is also theory that everyone has the right to determine his or her own moral rules. Of course, as Hare (1993) believes, the moral rules of most individuals in a given society look the same in practice, because they are likely to have the same cultural experience. In social ethics, Aristotle understands that society is a natural organization because it is a necessary place for humans to achieve happiness. In addition to the above division, ethics can also be distinguished into temperament ethics and moral ethics. Temperament ethics is a custom or habit that describes human behavior in living in society in a certain area, at a certain time. For example: wearing traditional clothes and associating with young people. Moral Ethics is concerned with the habit of behaving well and correctly based on human nature. For example: respecting parents and teachers and defending truth and justice.

Then according to Sulistyorini, morality is divided into three types, namely:

Individual morality, Individual morality is a morality that concerns the relationship of man with his own personal life or about the way man treats himself. This individual morality underlies human actions and becomes a guide for human life, which is the direction and rules that need to be followed in their personal or daily life. Individual morals include: obedience, courage, willingness to sacrifice, honesty, fair and wise, respect and appreciation, hard work, keep promises, know how to reciprocate, good character, humility, and careful in action.

Social Morality, according to Sulistyorini, is morality that concerns the relationship between humans and other humans in life in society or the surrounding environment. In dealing with society, humans need to understand the norms that apply in society so that their relationship with other humans can run smoothly and there are no misunderstandings between these humans. These social morals include cooperation, helpfulness, compassion, harmony, love to give advice, care for the fate of others, and love to help others.

Religious Morality, Religious morality is a morality that concerns man's relationship with God that he believes in. Religious morality includes believing in God's power, believing in God's existence, surrendering to God, and asking God for forgiveness. Sulistyorini states that morality to God includes believing and believing that God exists, obeying God's commandments and prohibitions, surrendering to God, worshiping and praying earnestly, hoping that God will bestow His grace, thinking well about God, trusting God completely, thanking God, and repenting to God.

Ethics and Morals in Science

Humans are given the ability as the best creation to develop science that distinguishes humans from other creatures or with the quality of human beings. This ability is expected to be an improvement in the standard of human life itself. Science is an attraction for the relentless desire of human curiosity and truth, so it is necessary to pay attention to ethics as an additional effect of science after it is applied in society. With this knowledge, all human activities are based on ethics. Karl Jaspers wrote that science is man's attempt to listen to the answers that come out of the world he inhabits. This is where ethics and science are attached (Zeidler et al., 2019).

Humans with knowledge will not be satisfied either in listening or looking for answers. New things will always be found in the stage of attaining knowledge. In his search for knowledge, there is no contradiction between matter and secret, between understanding and wonder, between science and religion (Zeidler & Sadler, 2019). However, there are restrictions that cannot be made by humans in the search for these essential values, such as the search for *alkhalism*, the creator of man himself. Neutral science can give rise to the understanding of truth, so that science becomes value-free. The explanation of human science should be strengthened by the awareness of the truth. Knowledge is not an end but a means to achieve the desire for the truth along with ethics for fellow human beings and religious responsibility. With responsibility, it means that scientists have ethics in their science. The knowledge that is found in man is limited, so with the knowledge of human curiosity that exists within him, it is a clue to the truth beyond the reach of man himself.

The ability of humans to develop science has given birth to new discoveries that have not existed before, for these discoveries humans have benefited directly. However, in addition to providing benefits for human life, the discovery of these new things has given birth to awareness of the existence of various works as human thoughts and feelings. In the Ancient Century, there were many copyrighted works produced by the people at that time. The resulting copyrighted works are considered ordinary of their existence, and there is no special protection for them. Nevertheless, they were able to maintain their ideas as scientists. There are even those who sacrifice their lives to defend their ideas and ideas that have united with their true selves. In history, the name Corpus

Juris is known as the person who first realized and embodies moral ethics in scientific works, both in the form of property rights in the form of writings and paintings on paper. However, his opinion has not yet reached the distinction between real objects (*materielles eigentum*) and unreal objects (*immaterielles eigentum*) which are the products of human creativity. The term *immaterielles eigentum* is what is now called "intellectual property right" (IPR). Which is a translation of the word "*geistiges eigentum*", or scientific intellectual property rights.

Moral ethics must bind all parties who produce science and technology or who use it because ethics and morals are important. Science and technology must facilitate and benefit human life, not damage or harm culture and civilization in human life.

Ethics and Morals in the World of Science and Humanity

Bramel divides the axiology into three parts. First, moral conduct, which is moral action. This field gave birth to a special discipline, namely ethics. The study of ethics focuses more on human behavior, norms and customs (Resnik, 2020). The purpose of ethics is for humans to know and be able to account for what they do. In ethics, the value of goodness from human behavior is the central question. It means behavior that is full of responsibility, both responsibility to oneself, society, nature and to God as the creator. The second part of axiology is aesthetic expression, which is the expression of beauty. This field gives birth to beauty (van der Leij & Knippels, 2021). Aesthetics is concerned with the value of the experience of beauty that humans have towards the environment and the phenomena around it.

Quoting Risieri Frondiz's opinion, whether the value is objective or subjective depends on the results of his views that emerge from philosophy (Tasadi, 2019). Value will be subjective, if the subject plays a major role in everything, human consciousness becomes the benchmark for everything; or its existence, its meaning and its validity depend on the reaction of the subject who makes the assessment without considering whether it is psychic or physical. Thus, subjective values will always pay attention to various views that human intellect has, such as feelings, intellect, and the results of subjective values will always lead to likes or dislikes, happy or unhappy (Sulistyorini, 2011; Sutisna, 2020).

Furthermore, the value will be objective, if it does not depend on the subject or consciousness that is assessing. Objective value arises because of the philosophical view of objectivism. This objectivism assumes that the benchmark of an idea is in its object, something that has a degree actually exists (Lindemann & Häberlein, 2023).

The third part of Axiology is, socio-political life, that is, socio-political life that will give birth to sociopolitical philosophy. The benefits of science are that there are countless benefits from science for humans and living beings as a whole. From the time of Copernicus to Mark Elliot Zuckerberg, science continues to evolve and provide many benefits to humans. With human science it can get to the moon, with science humans can know the hidden and smallest parts of the human body's cells. Science has made a huge contribution to human civilization, but with science humans can also destroy other human civilizations (Shomali, 2011).

Quoting Francis Bacon in saying that "Knowledge is power". Whether that power will be a blessing or a catastrophe for mankind depends on the value system of the person who wields that power. Knowledge is neutral, science does not know good or bad qualities, and the owner of knowledge must have an attitude (Bostyn et al., 2020).

From what is formulated above, it can be said that whatever type of knowledge exists, all of it must be adjusted to the moral values that exist in society, so that the value of the usefulness of this knowledge can be felt by the community in its efforts to improve common welfare, not the

other way around, even causing disasters (Adjovi, 2025). For a scientist, the values and moral norms he has will determine whether he is a good scientist or not

Conclusion

Science drives the progress of civilization, yet its experimental process often relies on trial and error due to human rational limitations. Therefore, ethics are essential to maintain the neutrality and integrity of knowledge, and this is further enhanced when ethical considerations are supported by religious values—where scientific truth addresses empirical reality and religious truth reflects absolute principles. Without religion, knowledge risks becoming blind; without knowledge, religion becomes paralyzed. Ethics and morals play a crucial role in guiding human behavior within science, forming the foundation for the responsible development and application of knowledge that benefits society. Integrating ethics, morals, and science is vital to cultivating a generation equipped with both broad knowledge and strong moral awareness. Ethical values guide scientists in validating data, hypotheses, and applications, while morality ensures that knowledge is used with regard for humanity and the common good. Future research should explore practical frameworks for embedding this integration into scientific education and practice to promote sustainable and socially responsible scientific advancement.

References

- Adjovi, I. S. M. (2025). A worldwide itinerary of research ethics in science for a better social responsibility and justice: A bibliometric analysis and review. *Frontiers in Research Metrics and Analytics*, 10, Article 1504937. <https://doi.org/10.3389/frma.2025.1504937>
- Al-Khafaji, M. A., Hatem, W. A., & Sadiq, S. S. (2024). Unveiling scientific integrity in scholarly publications: A bibliometric approach. *International Journal for Educational Integrity*, 21(1), Article 7. <https://doi.org/10.1007/s40979-024-00164-5>
- Asrulla, dkk. (n.d.). Konsepsi etika, moral, dan ilmu pengetahuan dalam perspektif humanisme. *Jurnal Genta Mulia*, 15(2). P-ISSN: 2301-6671, E-ISSN: 2580-6416.
- A. Susanto. (2011). *Filsafat ilmu: Suatu kajian dalam dimensi ontologis, epistemologis, dan aksiologis*. Jakarta: Bumi Aksara.
- Aburaera, dkk. (2013). *Filsafat hukum: Teori dan praktik*. Jakarta: Prenadamedia Group.
- Bakhtiar, A. (2012). *Filsafat ilmu*. Jakarta: RajaGrafindo Persada.
- Basar, H. H., dkk. (2024). Etika dan moral dalam ilmu pengetahuan. *Indonesia Research Journal On Education*, 4(1). <https://irje.org/index.php/irje>
- Bostyn, D. H., Sevenhant, S., & Roets, A. (2020). Utilitarianism in minimal-group decision making is less common than equality-based morality, mostly harm-oriented, and rarely impartial. *Scientific Reports*, 10, Article 13092. <https://doi.org/10.1038/s41598-020-70199-4>
- Budiono Kusumohamadjojo. (2013). *Filsafat Yunani klasik: Relevansi untuk abad XXI*. Yogyakarta: Jalasutra.
- Endang Pratiwi, Theo Negoro, & Hassanain Haykal. (2022). Teori utilitarianisme Jeremy Bentham: Tujuan hukum atau metode pengujian produk hukum. *Jurnal Konstitusi*, 19(2).
- Fensi, F. (2020). Menafsir Ahok dari perspektif etika utilitarianisme (analisis hermeneutik pada komunikasi & tindakan politik). *Jurnal Semiotika*, 10(2).
- Fitrian Hastiadi, dkk. (2019). Handout filsafat pendidikan, etika pendidikan dan pendidikan karakter. *Academia: Accelerating the world's research*.
- Hambali, M. R., dkk. (2021). *Etika profesi*. Jawa Timur: Agrapana Media.

- Ipel, Gunadi. (2017). Konsep etika menurut Franz Magnis Suseno. Skripsi S1, Fakultas Ushuluddin, Universitas Islam Negeri Ar-Raniry, Banda Aceh.
- Jamil, J. (2022). Etika profesi guru. Sumatera Barat: Azka Pustaka.
- Mill, J. S. (2020). Utilitarianisme (Artika Sari, Terj.). Yogyakarta: Basabasi.
- Muhammad A. Shomali. (2011). Relativisme etika: Analisis prinsip-prinsip moralitas. Jakarta: Shadra Press.
- Muhammad Amri, dkk. (2018). Aqidah akhlak. Makassar: Semesta Aksara.
- Natriana Syam, dkk. (2025). Etika dalam ilmu pengetahuan. Jurnal Pemikiran Pendidikan, 31(1). <https://doi.org/10.30587/didaktika.v31i1.9066>
- Olimpo, J. T., Pervolaraki, M., Anderson, C. B., Attwood, G., Bain, K., Ballen, C. J., Bennett, D., Bouwma-Gearhart, J., Corwin, L. A., DeChenne-Peters, S. E., Dolan, E., Eisler, L., Gentile, J., Goodman, A., Hagan, B., Kagey, J. D., Lauer, T. W., Lee, V., Lewis, J. E., ... Sevian, H. (2019). Recommendations for effective integration of ethics and responsible conduct of research (E/RCR) education into course-based undergraduate research experiences: A meeting report. CBE—Life Sciences Education, 18(2), Article ar25. <https://doi.org/10.1187/cbe.18-10-0203>
- Rafset Tasadi. (2019). Pentingnya etika dalam pendidikan. Ta'dib, 17(2), Desember.
- Resnik, D. B. (2020). What is ethics in research & why is it important? National Institute of Environmental Health Sciences. <https://www.niehs.nih.gov/research/resources/bioethics/whatis>
- Sjarkawi. (2011). Pembentukan kepribadian anak. Jakarta: Bumi Aksara.
- Sulistyorini. (2011). Evaluasi pendidikan dalam meningkatkan mutu pendidikan. Yogyakarta: Teras.
- Syafrizal. (2017). Pembinaan moralitas remaja dalam keluarga. Jurnal Studi Penelitian Riset dan Pengembangan Pendidikan Islam, 2 Juli.
- Syamsu Yusuf. (2016). Psikologi perkembangan anak & remaja. Bandung: Remaja Rosdakarya.
- Sutisna, U. (2020). Etika belajar dalam Islam. Jurnal Ilmiah Kependidikan, 7(1).
- Van der Leij, T., & Knippels, M. C. P. J. (2021). Supporting secondary students' morality development in science education. International Journal of Science Education, 43(12), 1965–1989. <https://doi.org/10.1080/03057267.2021.1944716>
- Zeidler, D. L., & Sadler, T. D. (2019). New directions in socioscientific issues research. Disciplinary and Interdisciplinary Science Education Research, 1(1), Article 11. <https://doi.org/10.1186/s43031-019-0008-7>
- Zeidler, D. L., Sadler, T. D., Applebaum, S., & Callahan, B. E. (2019). Moral–ethical character and science education: EcoJustice ethics through socioscientific issues (SSI). In D. J. Tippins, M. P. Mueller, M. van Eijck, & J. D. Adams (Eds.), Cultural studies and environmentalism: The confluence of EcoJustice, place-based (science) education, and indigenous knowledge systems (pp. 105–128). Springer. https://doi.org/10.1007/978-90-481-3929-3_8