KASU Journal of Science and Mathematics Education (KJSME)
Volume 1, Number 2, November, 2025 ISSN: 2360-8889
http://journals.kasu.edu.ng/index.php/Science_Education

THE ETHICAL IMPACT OF EMERGING TECHNOLOGY ON SOCIETY

By

Timothy Bulus[1], Magaji Simon[2], Emmanuel Jaiyeoba[3], Adam Usman Ahmed[4]

[1]Department of Science Education, Kaduna State University

[2]Department of Science, Kaduna State College of Nursing and Midwifery, Kafanchan Campus

[3]Department of Physics, Kaduna State University

[4]Department of Library Science, Kaduna state University

Corresponding Author email: timothy.bulus@kasu.edu.ng

Abstract

The rapid emergence of science and technology has profound ethical implications for society, shaping the way we live, interact, and envision the future. This paper explores the intersection of technological advancement and ethical considerations, focusing on how modern innovations influence societal structures, environmental sustainability, and human values. By examining key technological developments that are poised to redefine our world, this study highlights the interdependence between technological progress and societal growth. It also investigates the ethical challenges arising from these advancements, including their impact on communities, the environment, and global interconnectedness. This research emphasizes the importance of ethical frameworks in guiding the development and application of emerging technologies. Drawing on past and current studies, the paper analyzes the ethical implications of technological progress and its effects on modern society. It discusses both the positive and negative consequences of technological innovation, offering insights into how society can navigate these changes responsibly. The findings underscore the need for interdisciplinary collaboration and policy interventions to ensure that technological advancements align with societal well-being and ethical principles.

***Keywords**: Emerging technologies, ethical considerations, societal impact, technological progress, environmental sustainability, interdisciplinary research.*

INTRODUCTION

Technology is a product of the dynamic interplay between the natural world and human ingenuity, serving as both a tool and a reflection of societal values. This article examines the origins, development, and contemporary implications of technology in relation to humanity and the environment. We argue that technology must be understood as a multifaceted phenomenon, shaped by the complex interplay of natural, social, and technical systems. At the heart of this discussion lies the fundamental contradiction of the "nature-society-technology" triad, which reveals the mechanisms through which technology is generated and its broader impact on global systems.

The systematic linkage between science and technology provides a foundation for designing and reshaping human environments. However, the rapid advancement of technology raises critical ethical questions, particularly in the context of globalization. As Heidegger (1993) and others have noted, the globalization of technology has created an interconnected technological chain that spans the globe, influencing resource consumption, production methods, and lifestyles. This interconnectedness has been further amplified by digital and social media, which have expanded the scope of societal interaction and communication (Adorno, 1989; Gjylbegaj & Abdi, 2019; Dash & Dash, 2019). Yet, this progress is not without challenges. Regional conflicts, environmental degradation, demographic pressures, and the erosion of cultural values pose significant obstacles to the sustainable development of modern civilization (Kumar et al., 2020; Patyukova et al., 2018).

A key question arises: To what extent are these challenges linked to the objective principles of scientific and technological advancement? Specifically, how do technological systems balance the pursuit of progress with the need for environmental sustainability and societal well-being? While globalization expands the scope of technological influence, scientific advancements delve deeper into the material world, uncovering new laws and developing tools to manipulate both physical and psychological realms. For instance, breakthroughs in genetic engineering and biotechnology aim to address food scarcity and environmental issues, yet they carry the risk of unintended consequences, such as ecological contamination.

The ethical impact of emerging technologies on society is a subject of interdisciplinary research, encompassing fields such as philosophy, environmental science, and sociology. Philosophical analysis, as demonstrated by thinkers like Adorno (1989), Bell (1999), Berdyaev (1989),

Mumford (1974), Heidegger (1993), and Ellul (1986), provides a foundational understanding of technology and its societal implications. However, establishing ethical guidelines for the development and deployment of emerging technologies remains a practical challenge. Issues such as informed consent, scientific uncertainty, and the potential for unforeseen risks complicate the creation of robust ethical frameworks. Despite these challenges, it is imperative to address the ethical, legal, and social implications of emerging technologies to prevent their release into what some scholars describe as a moral and policy vacuum.

Recent literature has extensively explored the development of technology and its societal effects. For example, Dergacheva (2014) examined the biosphere's transition into a technogenic era, highlighting the harm caused by technological systems that prioritize human demands over ecological preservation. Similarly, Tyurina (2018) emphasized the need for an eco-conscious approach to technological development, advocating for a harmonious integration of ecological and technological visions. Other studies, such as those by Shapovalova and Gozhenko (2015) and Shcherbakova (2018), focus on the sociocultural dimensions of technology, analyzing its pervasive influence on modern lifestyles and the technosphere's role in shaping human reality.

Building on these insights, this paper aims to analyze the ethical impact of emerging technologies on society. By synthesizing past and current research, we seek to contribute to a deeper understanding of how technological progress shapes the future and how ethical considerations can guide its development. Ultimately, this study underscores the importance of interdisciplinary collaboration and ethical foresight in ensuring that technological advancements align with the principles of sustainability, equity, and human well-being.

OBJECTIVES

The main objective of this research is to explore the ethical implications multidimensional development of technology on society. To achieve this, the study aims to:

1. Analyze the emergence of technology and its evolution in relation to human and environmental systems.
2. Examine the ethical considerations associated with the adoption and implementation of emerging technologies, particularly their impact on societal well-being and environmental sustainability.

3. Investigate the interconnected system of science and technology and its role in shaping human society and the natural environment.

RESEARCH QUESTIONS

1. What are the societal impacts of emerging technologies, both positive and negative?
2. What ethical considerations should guide the development and adoption of emerging technologies?
3. How does the integration of science and technology influence humanity and the environment?

HYPOTHESES

1. **Null Hypothesis (H_0):** Emerging technologies have no significant impact on society.
2. **Null Hypothesis (H_0):** Ethical considerations are not necessary when introducing new technologies.

Related works

Technology is inspired either by the natural environment or by the purposeful actions of humankind (they are perceived as a coercive influence of an independently existing artificial world on man and society). A quite number of international scientists note the importance of the influence of various “smart” technologies on modern education. For instance, Wang examined the reason students choose technical subjects and how the environment determines their choice (Wang, 2013), while a group of Asian scientists examined the advantages and disadvantages of using smart phones (Anshari, Almunawar, Shahrill, Wickasono, & Huda, 2017). Also, American scientists conducted a study on the relationship between technology and the behavior of the younger generation in the school environment (Gobert et al., 2011; Hinduja & Patchin, 2013). Simonenko (2001) proposed an approach called ‘the socio-natural approach’ which explores the contradictory effect of the technogenic environment on people’s life but when view on the one hand, it creates a comfortable artificial world and satisfies the material needs of people, supports their existence; and on the other, the technogenic factor has an increasingly negative impact on the biosphere and socio-cultural processes. Therefore, philosophers give different assessments of

technological development. Some researchers believe that with the growth and increasing complexity, the technical reality naturally gets out of people's control. Other scholars assume that the tendency (and the goal) of technological innovation is human control over the techno sphere and the creation of an artificial environment that is most adapted to it (Rozin, 1999). The real essence of socio-natural development is the transition from biosphere evolution (when humanity existed within the biosphere and obeyed its laws) to the techno sphere (when people can consciously regulate their life and biosphere processes by technical means). However, the growing technogenic pressure on natural processes (including the biological aspects of human life) and social patterns (the emergence of social mechanisms that embody the inertia of technological development and ensure further growth of the techno sphere without humans' conscious wish) have led to undesirable changes.

Technology is a process phenomenon covering all types of technical changes. A change is a universal characteristic of technical reality that implies a constant qualitative transformation of technical objects. One can distinguish two types of functional changes: technological (which entails an increase in the complexity of the operating system or complicates and differentiates its connection with the external environment– natural and socio-cultural) and non-technological (which is associated with a simple organization and more basic structure of a technical object due to its consumption or destruction). The very existence of the technogenic environment, despite non-technological changes, depends on the processes that maintain its self- identity, self-reproduction, confronting the processes of decay. The external environment also poses new requirements for artificial reality, and they must be considered when reproducing it (Watt, 2008). Practice shows that the technogenic environment is not limited to self-reproduction. The collision of science-oriented rationalism and unforeseen consequences of technical activity (against the general background of its development according to the laws established during its creation) leads to the introduction (for explanatory purposes) of the concept of autonomy. The source of this autonomy is the freedom of human activity, which objectifies itself in the created technical objects (which means creativity is independent of its rational component). The uncontrolled development of the creative potential of the technogenic environment that is not regulated by discursive practices becomes the primary source of random results of technical activity (regarding the fundamental rules). A human cannot control himself; unable to give up the importance of control in general, a human is looking for a solution to problems (Schurov, 1994). A systematic organization of the technogenic environment is often seen as a way out of

Cite this article as:
Timothy Bulus Et al. (2025). The Ethical Impact of Emerging Technology on Sociaty

this situation since it means subordination to uniform constant laws. This idea is not perfect, although the conditions and consequences of its implementation should be subject to careful consideration. Consequently, the concept of random fluctuation, which emerges during the interaction of these processes, should be introduced into the categorical apparatus of a new analysis of technology (Kutyrev, 2014). Thus, the active essence of man and the material manifestations of the activity underlie the negative trends of the modern era that are linked with all aspects of the social-natural whole.

The impact of technology on the environment and various areas of life has been considered by many scholars. Technology influences many regions, even journalism (Flew, Spurgeon, Daniel, & Swift, 2012) and tourism (Gretzel, 2011). The crisis of modern civilization was caused by objective laws. According to A. Peccei, the real problem of the human species "lies in the fact that we were unable to culturally keep up and fully adapt to the changes that we introduced into this world" (Peccei, 1985). Our view of a globally oriented social project focused at resolving the crisis should be substantially modified to consider indirect relationships and provide new ways of influencing the industrial environment (Kumar etal., 2020). All the problems mentioned above related to the formation of the technogenic environment evolving due to the development of science and technology are highly relevant for modern Kazakhstan. Their foundations were laid by academic K. I. Satpayev (Izotov & Sarsenbaeva, 2009), in particular, in mechanics, mathematics, machine mechanics, and other fields. Science, engineering, and technology should be developed on a holistic, systemic basis as a result of cooperation between the state and Kazakh scientific and engineering community with determining mutual obligations, basic principles, and conditions for the functioning of science and technology in Kazakhstan, as well as the formation of a man-sized holistic technological environment. This, undoubtedly, will contribute to solving the urgent problems facing the Republic of Kazakhstan related to the industrial and innovative development in the 21st century. Therefore, a philosophical analysis of technology should be followed with the consideration of the result of technological development – the technogenic environment. Even when exploring individual technical systems at the local engineering level, one should analyze their interaction with humans. There is an understanding that human and machine components cannot be considered and designed separately. Therefore, a modern engineer cannot work without system concepts, methods of system analysis, and other integrative and general scientific approaches. In conclusion, it was demonstrated that in the modern world, technology acts as a mechanism for generating new cultural meanings and an

Cite this article as:
Timothy Bulus Et al. (2025). The Ethical Impact of Emerging Technology on Sociaty

instrument of socialization and personal development. The lack of controllability of the technical reality in a technogenic society (where the technology represents the source of integrating various aspects of human life) is a global problem that attracts significant attention. Gaining control over technology seems to be a prerequisite for the liberation of humans, the basis for overcoming the insufficient adequacy of their existence

Methods

The study adopts a descriptive research design to investigate the ethical and societal dimensions of emerging technologies using statistical tools to analyze data and test hypotheses.

A simple random sampling was used to select participants from a diverse population. This approach minimizes bias and ensures that every individual in the population has an equal chance of being selected. The study targeted a sample size of fifty participants, chosen to provide a balance between feasibility and statistical reliability. The sample included individuals from various demographic backgrounds to capture a wide range of perspectives on emerging technologies and their societal impacts.

Data was collected using structured questionnaires, which were distributed to the selected participants. The questionnaire was designed to gather quantitative data (e.g., Likert-scale responses) on societal implications of emerging technologies. The questionnaire covered key themes such as:

- The perceived benefits and risks of emerging technologies.
- Ethical considerations in the adoption of new technologies.
- The role of science and technology in shaping society and the environment.

The collected data was analyzed using descriptive statistics where Mean and Standard Deviation were calculated to summarize the central tendency and variability of the data, providing insights into participants' perceptions and attitudes. While t-test was conducted for inferential statistical techniques to test the study's hypotheses at a 5% level of significance. This statistical tool was used to determine whether there were significant differences in participants' responses related to the societal and ethical impacts of emerging technologies.

Ethical Considerations

Participants were provided with detailed information about the study's purpose and they are informed that their involvement is voluntary and they could withdraw at any time without penalty in an Informed Consent letter before participation. All responses were also anonym zed to protect participants' privacy.

Limitations

While the study provides valuable insights, the sample size, though adequate for preliminary analysis, may not fully represent the diversity of global perspectives on emerging technologies. Similarly, the reliance on self-reported data may introduce biases, such as social desirability bias.

Result

Descriptive Statistics

Descriptive statistics are used to understand the distribution of the data collected. It really helps to provide a concise and easily interpretable summary of the data. It can also inform us of the choice of statistical tests and models for further analysis.

In this research we implore the following descriptive statistical tools to analyzed our data such as the average mean, mode and standard deviation. Using a questionnaire of 5 scale points, by given it to all set of academic levels such as secondary certificate (SSCE), Tertiary (NCE, ND, HND, Degree, Master degree) of fifty (50) people. Most of the respondents are tertiary certified personnel. The average mean of the respondents on the impact of emerging technologies is 3.77 and that of those that agreed the need for ethics to be taken into consideration is 3.92.

Interpretation:

(A) **- 75% (3.77) of participants agreed** that emerging technologies have significant societal impacts, reflecting the widespread recognition of both the benefits and challenges associated with technological advancements such as;

Benefits:

1. Improved Efficiency: Automation and AI optimize processes, reducing time and increasing productivity.

2. Enhanced Communication: The internet and mobile devices facilitate global connectivity and instant communication.

3. Access to Information: The internet provides vast amounts of information, promoting knowledge sharing and education.

4. Economic Growth: Technological innovations create new industries, jobs, and opportunities for economic growth.

5. Improved Healthcare: Medical technologies enhance diagnosis, treatment, and patient care.

Challenges:

1. Job Displacement: Automation and AI may replace human workers, particularly in industries with repetitive tasks.

2. Cyber security Threats: Increased connectivity and data storage raise concerns about data breaches and cyberattacks.

3. Digital Divide: Unequal access to technology and internet connectivity exacerbates social and economic inequalities.

4. Environmental Impact: The production and disposal of electronic devices contribute to e-waste and environmental pollution.

5. Social Isolation: Excessive technology use can lead to social isolation, decreased face-to-face interaction, and mental health concerns.

6. Ethical Concerns: Biometric data collection, AI decision-making, and surveillance technologies raise ethical concerns about privacy and autonomy.

- **25% of participants disagreed**, indicating that a minority of respondents either did not perceive significant impacts or were uncertain about the effects of emerging technologies.

(B) – 78% (3.92) of participants agreed the need to imbibed ethics in the introduction of emerging technologies on the society which will minimize the negative of the technological advancement in the society.

- 22% of participants disagreed that there is no need of considering the society but rather the technological advancement should be put in place as far there is positive impact.

HYPOTHESIS 1: There are no significant effects of emerging technology on the society

Question	population	Mean X	Standard Deviation (S.D)	X_{total}	$S.D_{total}$	t_{cal}
1.0 2.0 3.0 4.0	50	3.84 3.58 3.86 3.80	1.27 1.31 1.30 1.43	3.77	1.33	4.1o

The degree of freedom is 4 at 0.05 significant gives critical value of t to be 2.776. Since the calculated value is greater than the p-value, we reject the hypothesis. Accepting the fact that the emerging technologies has great effects on the society.

HYPOTHESIS 2: Ethical consideration should not be considered when introducing emerging technologies on the society.

Question	Population	Mean X	Standard Deviation (S.D)	X_{total}	$S.D_{total}$	t_{cal}
5.0 6.0 7.0	50	3.84 3.96 3.96	1.20 1.18 1.22	3.92	1.20	5.41

The degree of freedom is 4 at 0.05 significant gives critical value of t to be **2.776.** Since the calculated value is greater than the p-value, we reject the hypothesis. Accepting the reality that ethical consideration should be considered when introducing emerging on the Society.

Cite this article as:
Timothy Bulus Et al. (2025). The Ethical Impact of Emerging Technology on Sociaty

Discussion

The findings of this study reveal significant insights into the societal and ethical impacts of emerging technologies. A majority of participants agreed that emerging technologies have both positive and negative effects on society, highlighting the dual nature of technological advancement. These findings provide a nuanced understanding of how emerging technologies shape modern life.

Many respondents emphasized that technological innovation drives economic development by creating new industries, fostering entrepreneurship, and generating employment opportunities. For instance, advancements in artificial intelligence (AI), renewable energy, and biotechnology have opened up new markets and career paths. Similarly, emerging technologies were seen as catalysts for rapid development in areas such as healthcare, education, and communication. For example, telemedicine and online learning platforms have expanded access to essential services, particularly in underserved communities. In addition, participants noted that technologies such as smart home devices, wearable health monitors, and automation have enhanced convenience, safety, and overall well-being.

On the other hand, automation and AI were identified as key drivers of job displacement, particularly in industries reliant on manual labor. This has led to concerns about widening income inequality and the marginalization of vulnerable populations. While, excessive screen time and the rise of digital communication platforms were linked to a decline in face-to-face interactions, contributing to social isolation and weakened personal relationships, the proliferation of digital technologies has created new opportunities for cybercrime, fraud, and data breaches, posing significant risks to individuals and organizations.

A significant finding of this study is the strong consensus among participants on the importance of ethical considerations in the development and deployment of emerging technologies. Key principles identified include:

- Ensuring that the processes and decision-making behind technological development are open and understandable to the public.
- Holding developers, corporations, and policymakers responsible for the societal impacts of their technologies.

- Promoting inclusive access to technological benefits and addressing disparities that may arise from their adoption.
- Safeguarding individuals' privacy, autonomy, and well-being in the face of technological advancements.
- These ethical principles are critical for guiding the responsible development of emerging technologies and mitigating potential harms.

Implications for Policy and Practice

The study's findings have several implications for policymakers, technologists, and society at large:

1. Governments and regulatory bodies should establish robust policies to address the ethical and societal challenges posed by emerging technologies. This includes measures to protect jobs, ensure data privacy, and promote equitable access to technological benefits.
2. Technology companies must adopt ethical practices, such as conducting impact assessments and engaging with stakeholders to address societal concerns.
3. Educating the public about the benefits and risks of emerging technologies can empower individuals to make informed decisions and advocate for responsible innovation.

Recommendations

Based on the findings of this study, the following recommendations are proposed to address the societal and ethical challenges posed by emerging technologies:

1. Governments, in collaboration with NGOs and private organizations, should organize workshops, seminars, and public awareness campaigns to educate citizens about the benefits and risks of emerging technologies. These initiatives should focus on practical applications of technologies in daily life, such as digital literacy, online safety, and responsible use of social media.

2. Emerging technologies should be integrated into school and university curricula to equip students with the skills needed for the future workforce. However, the use of technology in educational settings should be balanced to avoid over-reliance, which may lead to reduced focus on traditional learning methods.

3. Educators should be trained to effectively incorporate technology into teaching while ensuring that students remain engaged and serious about their studies. To mitigate the impact of job displacement caused by automation and artificial intelligence (AI), governments should consider implementing a stipend or universal basic income (UBI) to support affected individuals. This would provide financial stability while they transition to new roles or acquire new skills.
4. Governments and private organizations should invest in training programs to help workers develop technical skills relevant to emerging industries. This includes coding, data analysis, AI, and other digital competencies.
5. Governments and organizations must prioritize **cyber security** to protect individuals and businesses from cyber threats, fraud, and data breaches. This includes enacting stricter regulations, investing in advanced security technologies, and promoting public awareness of online safety practices.
6. Clear ethical guidelines should be established to govern the development and deployment of emerging technologies. These frameworks should emphasize transparency, accountability, fairness, and the protection of human rights.
7. Strict measures should be implemented to curb the spread of pornography, cyber bullying, and online fraud. This includes monitoring digital platforms, enforcing laws, and promoting responsible online behavior.
8. To reduce the negative health impacts of prolonged screen time, individuals should be encouraged to adopt the **20-20-20 rule**: every 20 minutes, take a 20-second break to look at something 20 feet away. This practice can help prevent eye strain and other health issues associated with excessive digital device use.
9. Schools, workplaces, and communities should promote digital detox programs to encourage individuals to take regular breaks from screens and engage in offline activities.
10. Governments, organizations, and researchers should collaborate on a global scale to address the challenges posed by emerging technologies. This includes sharing best practices, developing international standards, and coordinating efforts to tackle issues such as cyber security threats and environmental sustainability.

11. Partnerships between governments, private companies, and academic institutions can drive innovation while ensuring that technological advancements align with societal values and ethical principles

References

Adorno, T. O. (1989). About technology and humanism. In *Philosophy of technology in Germany*. Retrieved February 14, 2020.

Anshari, M., Almunawar, M. N., Shahrill, M., Wickasono, D. K., & Huda, M. (2017). Smartphone usage in the classrooms: Learning aid or interference? Education and Information Technologies, 22(6), 3063-3079. https://doi.org/10.1007/s10639-017- 9572-7

Bell, D. (1999). *The upcoming post-industrial society: Social forecasting experience*. Moscow: Academia.

Berdyaev, N. A. (1989). Human and machine. *Questions in Philosophy, 2*, 160–169.

Boyd, D. M., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society, 15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

Dash, R. K., & Dash, A. K. (2019). The new media and the promotion of ecological entrepreneurship. *Media Watch, 10*(2), 419–431. https://doi.org/10.15655/mw/2019/v10i2/49668

Ellul, J. (1986). *Another revolution: New technocratic wave in the West*.

Flew, T., Spurgeon, C., Daniel, A., & Swift, A. (2012). The promise of computational journalism. Journalism Practice, 6(2), 157- 171.

Furlong, K. (2011). Small technologies, big change: Rethinking infrastructure through STS and geography. *Progress in Human Geography, 35*(4), 460–482. https://doi.org/10.1177/0309132510380488

Gjylbegaj, V., & Abdi, H. M. (2019). The effects of social media on family communication in the UAE. *Media Watch, 10*(2), 387–397. https://doi.org/10.15655/mw/2019/v10i2/49663

Gobert, J. D., O'Dwyer, L. M., Horwitz, P., Buckley, B. C., Levy, S. T., & Wilensky, U. J. (2011). Examining the relationship between students' understanding of the nature of

models and conceptual learning in biology, physics, and chemistry. International Journal of Science Education, 33(5), 653-684.

Gretzel, U. (2011). Intelligent systems in tourism: A social science perspective. *Annals of Tourism Research, 38*(3), 757–779. https://doi.org/10.1016/j.annals.2011.01.019

Heidegger, M. (1993). *Time and being*. Moscow: Respublika.

Hinduja, S., & Patchin, J. W. (2013). Social influences on cyberbullying behaviors among middle and high school students. Journal of Youth and Adolescence, 42(5), 711-722.

Izotov, M. Z., & Sarsenbaeva, Z. N. (2009). Science in Kazakhstan: History and Modern Times (A Philosophical Study in Two Books). Almaty: KIC IFP MES RK.

Kosichenko, A. G. (2014). *The possibilities of religion in reducing the level of challenges and threats of our time*. Almaty: KIC IFP MES RK.

Kovalev, A. M. (2000). *Society as a developing organism*. Moscow: Plamya.

Kumar, A. S., Camacho, S., Searby, N. D., Teuben, J., & Balogh, W. (2020). Coordinated capacity development to maximize the contributions of space science, technology, and its applications in support of implementing global sustainable development agendas—A conceptual framework. *Space Policy, 51*, 101346. https://doi.org/10.1016/j.spacepol.2020.101346

Kutyrev, V. A. (1996). Ecological crisis, postmodernism, and culture. *Problems of Philosophy, 11*, 23–31.

Kutyrev, V. A. (2014). *Natural and artificial: The struggle of the worlds*. Moscow, Berlin: Direct Media.

Moor, J. H. (2005). Why we need better ethics for emerging technologies. *Ethics and Information Technology, 7*(3), 111–119. https://doi.org/10.1007/s10676-006-0008-0

Mumford, L. (1974). *Mythos der Maschine: Kultur, Technik und Macht*. Wien: Europaverlag.

Neretina, S. S. (2001). Concept. In *New philosophical encyclopedia* (Vol. 2, pp. 306–307).

Patyukova, R. V., Minskaya, A. N., Sergienko, V. A., & Tarasenko, E. V. (2018). System of technologies for building the information space: Coverage tools. *Media Watch, 9*(3), 418–425. https://doi.org/10.15655/mw/2018/v9i3/49476

Peccei, A. (1985). Human Qualities.

Rozin, V. M. (1999). Approaches and methods for studying engineering and technology. In IT and Technology. Moscow: IFRAN, p. 213.

Schurov, V. A. (1994). Technology in the World of Man, Man in the World of Technology. Nizhny Novgorod: Respublika.

Shapovalova, I. S., & Gozhenko, G. I. (2015). The concept of technosphere: An analytical review of formation and study. *Scientific Result: Sociology and Management Series, 2*, 51–57. Retrieved July 22, 2020, from [insert URL if available]

Shcherbakova, S. I. (2018). Socio-philosophical understanding of the way of life in a technogenic society. *Herald of Vyatka State University, 2*, 57–65.

Simonenko, V. D. (2001). Technological Culture and Education. Bryansk: Publishing House of Bryansk State University.

Tyurina, T. A. (2018). Ecological and technical picture of the world as an imperative of sustainable development of modern civilization. *Bulletin of Buryat State University, 3*(4), 10–18.

Wang, X. (2013). Why students choose STEM majors: Motivation, high school learning, and postsecondary context of support. American Educational Research Journal, 50(5), 1081-1121.

Watt, W. M. (2008). The Influence of Islam on Medieval Europe. St. Petersburg: Dilya. Westley, F.

Young, M. S., Brookhuis, K. A., Wickens, C. D., & Hancock, P. A. (2015). State of the science: Mental workload in ergonomics. *Ergonomics, 58*(1), 1–17. https://doi.org/10.1080/00140139.2014.956151