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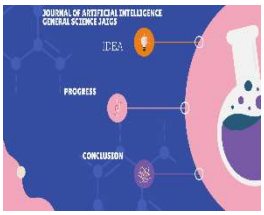

The Impact of AI on Education: Innovative Tools and Trends

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ABSTRACT

Every year, digital technologies appear in every industry. The new, developing technologies offer both advantages and disadvantages. The following are some recent examples of cutting-edge innovations in technology: data science, cybersecurity, block chain technology, artificial intelligence, machine learning, quantum learning, Internet of Things (IoT), 5G and 6G networks, hyper automation, cloud computing, robotics, and natural language processing. AL and ML combined with other cutting-edge, popular technologies have the potential to yield the positive outcomes and contribute to a greener future. Personalized medicine, drug development and predictive diagnostics using large scale data sets are all areas where machine learning might be beneficial to physicians. Students studying mechanical engineering must have a solid understanding of emerging trends such as autonomous vehicles. The potential of AV to create new, improved lifestyle and revolutionize urban planning and transportation has attracted a lot of interest. A research utilized a quantitative technique to further his research. A questionnaire was used to collect data from different participants, and 120 students from different fields in higher education sector were chosen at random. According to research, students who used popular technologies acquired more sophisticated abilities that will increase their output at work. Technology is always changing because it takes ongoing training to keep up with the latest development. The issue of the digital divide will be resolved by ongoing training.

Introduction

In today's digital age, the integration of Information and Communication Technologies (ICTs) into education has become indispensable. As educators, it is crucial that we continuously strive to adapt and enhance our ICT skills to meet the evolving needs of our learners and the demands of modern learning environments. In this digital world technologies are used in many spheres of life including Health, industries and in education. By integrating ICT into education, instructors can help learners develop the competencies they need to thrive in the digital age and adapt to emerging technologies seamlessly. By harnessing the power of ICT, instructors can foster cross-cultural understanding, collaboration, and the exchange of ideas among learners. In a world driven by technology, equipping learners with strong digital literacy skills is essential for their future success. ICTs facilitates collaboration and connectivity on a global scale, breaking down geographical barriers and enabling students to connect with peers and experts from around the world. It is noteworthy that as the new technologies develops that there are also threats such cyber-attacks so innovations to stop this are necessary.

Objectives

-AL and ML: To find out the benefits of artificial intelligence and machine learning in education

-Tools and Trends: To ascertain the tools and technologies frequently used by the students focusing mainly on the trending and new emerging digital tools

-Negative impact of using digital tools: To investigate the negative impacts of using digital tools

Materials and Methods

Research Design

The researcher employed quantitative approach. Quantitative method focusses on generalizing across group of people or to explain a particular phenomenon. A descriptive method was used. Descriptive research aims to accurately and systematically describe a population, situation or phenomenon (Mohajan, (2020). It can answer what, where, when and how questions, but not why questions. A descriptive research design can use a wide variety of research methods to investigate one or more variables (Pesämaa, Zwikael, HairJr, & Huemann, (2021)

Sampling Strategy

Random sampling the is appropriate method for a quantitative research. What is Random Sampling. Random sampling is a part of the sampling technique in which each sample has an equal probability of being chosen A sample chosen randomly is meant to be an unbiased representation of the total population (Noor, Tajik, & Golzar, 2022).

A simple random sampling was used henceparticipants have an equal and fair chance of being selected. The researcher randomly selected students from various fields including education, engineering, human

and finance resource management, commerce and medicine in a higher education institution. Random selection method used gives every participant a fair chance, the resulting sample is unbiased and unaffected by the research team. It is a reliable method of obtaining information where every single member of population is chosen randomly, merely by chance A questionnaire was used to gather data from the participants.

Data Collection

A well designed questionnaire was used as the reliable instrument of collecting data. In certain cases, this was followed by brief interviews of certain participants to support the data collected.

Ethical Considerations:

- Privacy and Security: Ensuring data privacy and security protocols are adhered to during data collection, processing, and storage.

- Bias and Fairness: Mitigating biases in AI models to ensure fair and unbiased defect detection outcomes.

Literature Review

Open distance institutions are gradually introducing Artificial intelligence for the purpose of imparting knowledge to the learners. Artificial Intelligence is the ability of a computer program to learn and think. Everything can be considered Artificial intelligence if it involves a program doing something that we would normally think would rely on the intelligence of a human (Crompton,& Burke, (2023).

The field of artificial intelligence (AI) has shown an upward trend of growth in the 21st century (from 2000 to 2015). The evolution in AI has advanced the development of human society in our own time, with dramatic revolutions shaped by both theories and techniques (Liu, Kong, Xia, Bai, Wang, Qing, & Lee, 2018).

Artificial intelligence (AI) is one of the core drivers of industrial development and a critical factor in promoting the integration of emerging technologies, such as graphic processing unit, Internet of Things, cloud computing, and the block chain, in the new generation of big data and Industry 4.0. In this paper, we construct an extensive survey over the period 1961–2018 of AI and deep learning (Gašević., Siemens, & Sadiq, (2023).

The research provides a valuable reference for researchers and practitioners through the multi-angle systematic analysis of AI, from underlying mechanisms to practical applications, from fundamental algorithms to industrial achievements, from current status to future trends. Although there exist many issues toward AI, it is undoubtful that AI has become an innovative and revolutionary assistant in a wide range of applications and fields (Lu, (2019).

Haug & Drazen (2023) posits that Artificial intelligence (AI) is transforming the way we live, work, and interact. From our personal lifestyles through our social engagements to the way we conduct our private and corporate businesses, AI is altering our methodologies and changing the landscape of end products. From the age-old medical expert systems and intelligent search engines to intelligent chatbots and predictive models, the enthusiasm for AI practice is growing rapidly. This will help enthusiastic readers take strategic steps toward getting involved in the process and contributing to the digital transformation efforts in the oil and gas industry

Prahani, Rizki, Jatmiko, Suprapto, & Amelia, (2022) contends that is society deals with the advances and disruptions owing to artificial intelligence, children must understand how it works. Especially that children grow up with these technologies will help them develop into informed citizens and better understand the world around them. While artificial intelligence education has been considered relevant, there is a growing global trend to teach artificial intelligence across K-12 levels. This development has necessitated designing and implementing artificial intelligence curriculum and related resources in schools. Notwithstanding that the developed curriculum may be adopted in another context, unique needs exist that suggest contextual and cultural values be considered. Besides, the current curriculum and resources designed to promote artificial intelligence education literacy are eastern and western-centric, which indicates a clear gap in artificial intelligence education in Africa

Machine learning is a field of artificial intelligence that is impacting lately in all areas of knowledge. The areas of social sciences, especially education, are no stranger to it, so, a systematic review of the literature on the techniques and applications of machine learning and artificial intelligence in Education is performed. The lack of knowledge and skills of educators in machine learning and artificial intelligence limits the optimal implementation of these technologies in education (Forero-Corba, & Bennasar, 2024)

It is increasingly common to interact with products that seem “intelligent”, although the label “artificial intelligence” may have been replaced by other euphemisms. Since November 2022, with the emergence of the ChatGPT tool, there has been an exponential increase in the use of artificial intelligence in all areas. Although ChatGPT is just one of many generative artificial intelligence technologies, its impact on teaching and learning processes has been significant.Generative artificial intelligence is extremely powerful and improving at an accelerated pace, but it is based on large language models with a probabilistic basis, which means that they have no capacity for reasoning or comprehension and are therefore susceptible to containing errors that need to be contrasted (García-Peñalvo, Llorens Largo, &Vidal, 2023).

It is hoped that the use of Artificial Intelligence will improve the quality and accessibility of education in various aspects, one of which is providing more efficient and personalized learning. It is believed that the use of artificial intelligence in the learning process can increase student concentration because of its ability to direct learning individually and identify areas that require a teaching approach that is appropriate for each student (Fitriani, Rosidah & Zafrullah, 2023).

However, applications of artificial intelligence in education are emerging and are new to researchers and practitioners alike. Reviews of the relevant literature have not examined how AI technologies have been integrated into each of the four key educational domains of learning, teaching, assessment, and administration. The relationships between the technologies and learning outcomes for students and teachers have also been neglectedChiu, Xia, Zhou, Chai, & Cheng, 2023).

Currently, in addition to AI there the new developing technological trends. Cloud computing, for example, will ensure that its future is robust, and the innovation helps to generate more businesses and opportunities globally. (Rehan, 2024). Sonko *et al* (2024) is of the view that the new trend known as autonomous vehicles is here to equip engineering students with skills of the 21st century. AV are garneting so much attention for their potential to generate new, enhanced life styles and transform traditional transportation and urban planning.

Metaverse as propounded by Sanchez-Acedo *et al* (2024), provides an immense experience of virtual world, and their trend enhances virtual estate, and spaces will become mainstream. In this case users can buy or sell virtual goods and services using block chain technology. Integrating AL and ML in businesses helps in automation (Donoho & Granitzer,2024). In order for all the new emerging trends to function more effectively and efficiently, networks such 5G and 3 G are essential (Chataut, Nankya and Akl, 2024).

Nilupi-Morena et al (2024) raised the issue of cybersecurity. Cybersecurity innovation is essential for human wellbeing. Innovation is helping us interconnect networks, devices data, systems and humans to some extent that these networks are more vulnerable to cyber-attacks. AI driven security operations enhance real time threat detention using AL and ML and thus define automated responses to complex cyber-attacks (Shandler & Canetti,2024).

Theoretical Framework

The paper is underpinned by Siemens' Theory of Connectivism which is built on the idea that digital technology brings people together and create learning opportunities. Connectivism begins when an individual turn to digital technology to solve problems. For instance, when a person is googling a question paper or texting a friend. The use of digital technology helps to solve problem and deeper understanding of the topic.

Models

The paper is underpinned by two models, namely, Horizon-Focused-Model and Staged Roadmap Model.

- Horizon-Focused Model entails that there are horizons which divide the digital transformation model into horizons. Every horizon denotes a distinct period with a unique set of goals, priorities or tactics.

- Staged Roadmap Model that entails that every stage has a distinct goal, deadline and benchmark to guarantee a well-defined route towards change.

Data Analysis

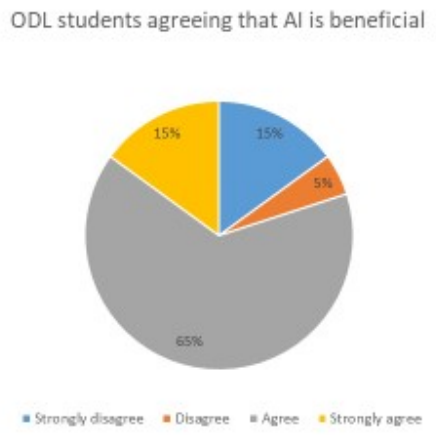
Tables, pie charts and graphs were used to analyse the collected data (Menachemi, Yiannoutsos, Dixon., Duszynski,. Fadel, -Kaloustian, & Halverson (2020).) Benefits of using emerging technologies, trending new technologies and impact of using digital tools were clearly stated during the analysis

Discussion And Interpretation Of Findings

Pie charts, graphs and tables were used to interpret the collected results.

Results Of Objective 1: Benefits Of Using Emerging Technologies

The pie chart answered the first objective about the benefits of digital technology.



A large number of students agreed that A I is beneficial. AI lead to access to high quality education, personalised training, efficiency and productivity, helps in engaging learner's experiences, it is the future for skills development, helps in community building, integration and empowers students.

AI can also improve how the students are assessed and guided while also helping to build digital literacy. This is made easily by the new trends and new emerging technologies. AI may enable achieving educational priorities in a better way, at scale and with lower costs.

AI eliminates human error: Humans make decisions based on individual judgements and biases. Using specific algorithms, machines make decisions based on empirical data and algorithms. Human beings are

physically limited. They cannot withstand all physical environments and high pressure situations for periods.

Results Of Objective 2: Trending Technologies In Higher Education

Institutions

The table below answered the second of objective that participants from different sectors have certain preferences of the new trending technologies and each sector tends to use preferred tools. Selected participants from different fields of study were instructed to rate their preferred trending technologies that are related to the desired careers.

The following table show the results:

New Trending Technologies	Rating Scale 1 - 10	Number of participants (Rates)
Machine Learning	10	49
Cloud Computing	5	7
Hyperautomation	4	5
Data Science	3	5
Metaverse	3	5
Autonomous Vehicles	9	38
Quantum Computing	6	11

The participants from the medical centre gave 100 % for Ml. There were 49 students from this field of study. Participants from health related field are more keen to ML hence it allows enterprises to apply machine learning algorithms for real-world problems, simplifying tasks, deploying suitable models, and making decisions using appropriate parameters. ML in health care help medicos in predictive diagnostics, personalized medicines, and drug discovery learning from extensive data sets.

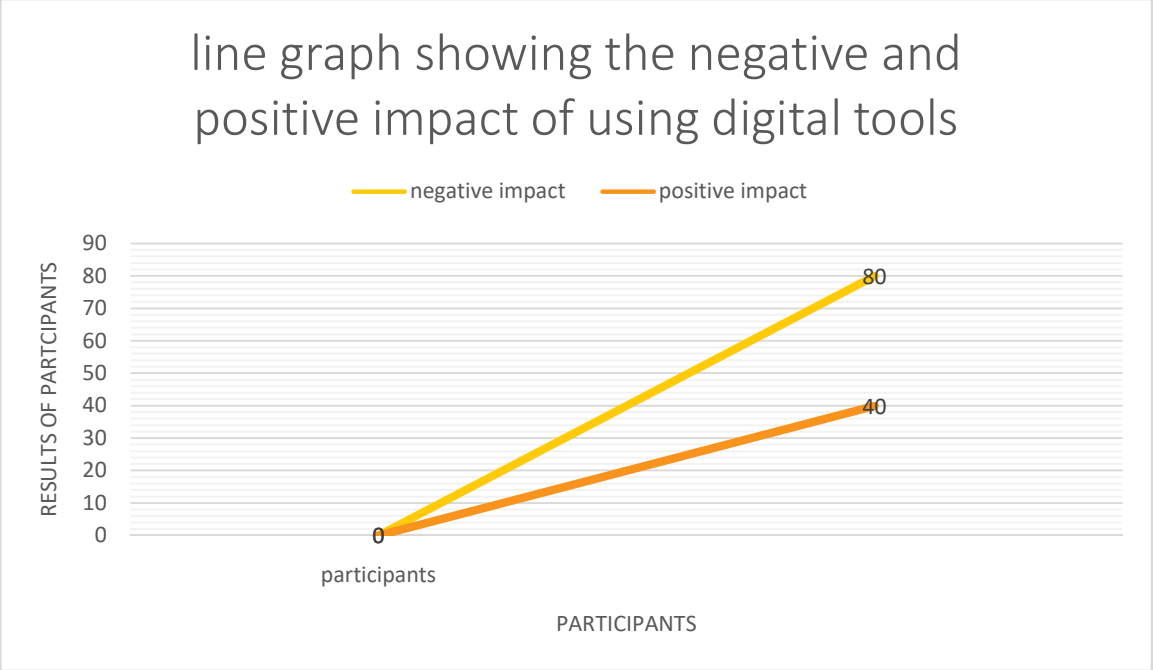
Participants from mechanical engineering field of study rated autonomous vehicles nine out of ten. There were 38 students from this field of study. Mechanical engineering students in AV's hence they are garnering so much attention for their potential to generate ne, enhanced lifestyles and thus can transform traditional transportation and urban planning.

Another trending emerging technology where participants showed interest was quantum computing hence helps to solve specific practical problems faster and efficiently than classical computers. QC is working on building hybrid computing solutions that combine classical systems with quantum computing solutions.

The leasst rated were data science and metaverse.

Results Of Objective 3: Negative Impacts Of Technology

The graph answered the third objective about the negative impact of using the digital tools.



Discussion

In the results summarized in a graph some participants cited the negative impacts of AI technology including the following: One the negative impact accompanied by the use of new digital technologies was cyber-attacks. Innovations helping us to interconnect including networks, devices, data, systems and human to some extent that these networks are more vulnerable to cyber-attack and thus cybersecurity innovation is essential for human well-being. AI driven security operations enhance real-time threat detentionusing AI and ML and define automated responses to complex cyber-attacks.

Other challenge was the high cost of data, poor infrastructure in developing areas, no signal to enable connection and gadgets that are more expensive. Other variables that result in negative impact were:

- High cost of emotion and designs,
- Humans become lazy
- Lead to the physical constraints, for an example, eyes are affected due to pronged use
- AI technology is most creative
- No ethics as emotions and
- There is lack of improvement.

Conclusion

In a nutshell, it clear that as we are in a Fourth Industrial Revolution it clear that there is not back everyone should be in a position to use digital tools be it in a management sector, medical field or engineering field. Training is also essential so that all in individuals should be in par on how to use the digital tools. One other thing that we should bear in mind is that technology is evolving, in each there are new emerging technologies.

REFERENCES

[1]. Akter, Most Sohana. "AI for Sustainability: Leveraging Technology to Address Global Environmental." *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023* 3, no. 1 (2024): 40-48.

[2]. Chataut, R., Nankya, M., & Akl, R. (2024). 6G networks and the AI revolution—Exploring technologies, applications, and emerging challenges. *Sensors*, *24*(6), 1888.

[3]. Chiu, T. K., Xia, Q., Zhou, X., Chai, C. S., & Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, *4*, 100118.

[4]. Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: the state of the field. *International Journal of Educational Technology in Higher Education*, *20*(1), 1-22.

[5]. Donoho, D. (2024). Data science at the singularity. *Harvard Data Science Review*, *6*(1).

[6]. Fitriani, A., Rosidah, R., & Zafrullah, Z. (2023). Biblioshiny: Implementation of artificial intelligence in education (1976-2023). *Journal of Technology Global*, *1*(01), 11-25.

[7]. Forero-Corba, W., & Bennasar, F. N. (2024). Techniques and applications of Machine Learning and Artificial Intelligence in education: a systematic review. *RIED-Revista Iberoamericana de Educación a Distancia*, *27*(1).

[8]. Gašević, D., Siemens, G., & Sadiq, S. (2023). Empowering learners for the age of artificial intelligence. *Computers and Education: Artificial Intelligence*, *4*, 100130.

[9]. García-Peñalvo, F. J., Llorens Largo, F., & Vidal, J. (2023). The new reality of education in the face of advances in generative artificial intelligence.

[10]. Granitzer, M., Voigt, S., Fathima, N. A., Golasowski, M., Guetl, C., Hecking, T., & Zerhoudi, S. (2024). Impact and development of an Open Web Index for open web search. *Journal of the Association for Information Science and Technology*, *75*(5), 512-520.

[11]. Haug, C. J., & Drazen, J. M. (2023). Artificial intelligence and machine learning in clinical medicine, 2023. *New England Journal of Medicine*, *388*(13), 1201-1208.

[12]. Islam, M. M. (2024). Autonomous Systems Revolution: Exploring the Future of Self-Driving Technology. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *3*(1), 16-23.

[13]. Liu, J., Kong, X., Xia, F., Bai, X., Wang, L., Qing, Q., & Lee, I. (2018). Artificial intelligence in the 21st century. *Ieee Access*, *6*, 34403-34421.

[14]. Lu, Y. (2019). Artificial intelligence: a survey on evolution, models, applications and future trends. *Journal of Management Analytics*, *6*(1), 1-29.

[15]. Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, *9*(4), 50-79.

[16]. Menachemi, N., Yiannoutsos, C. T., Dixon, B. E., Duszynski, T. J., Fadel, W. F., Wools-Kaloustian, K. K., & Halverson, P. K. (2020). Population point prevalence of SARS-CoV-2 infection based on a statewide random sample—Indiana, April 25–29, 2020. *Morbidity and Mortality Weekly Report*, *69*(29), 960.

[17]. Mullankandy, S. (2024). Navigating the Complexity of Regulations: Harnessing AI/ML for Precise Reporting. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *3*(1), 49-61.

[18]. Nilupú-Moreno, K., Salas-Riega, J. L., Ninaquispe-Soto, M., & Riega-Virú, Y. (2024). Cybersecurity in University Students: A Systematic Review of the Literature. In *International conference on WorldS4* (pp. 315-332). Springer, Singapore.

[19]. Nkambule, B., Ngubane, S., & Mncube, S. (2023). Learning Management System (LMS) for Academic Inclusion and Learning Agency: An Interpretive Review of Technoprogressivism in ODL Instructional Technology Policy. *Journal of Education, Society & Multiculturalism*, *4*(2), 48-84.

[20]. Noor, S., Tajik, O., & Golzar, J. (2022). Simple random sampling. *International Journal of Education & Language Studies*, *1*(2), 78-82.

[21]. Pal, S., & Pal, T. (2023). Master Data Management Disruptive Modern Architecture. *Journal of Knowledge Learning and Science Technology ISSN: 2959-6386 (online)*, *2*(1), 108-114

[22]. Pesämaa, O., Zwikael, O., HairJr, J., & Huemann, M. (2021). Publishing quantitative papers with rigor and transparency. *International Journal of Project Management*, *39*(3), 217-222.

[23]. Prahani, B. K., Rizki, I. A., Jatmiko, B., Suprapto, N., & Amelia, T. (2022). Artificial Intelligence in Education Research During the Last Ten Years: A Review and Bibliometric Study. *International Journal of Emerging Technologies in Learning*, *17*(8).

[24]. Ramírez, J. G. C. (2024). Natural Language Processing Advancements: Breaking Barriers in Human-Computer Interaction. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *3*(1), 31-39.

[25]. Rehan, H. (2024). Revolutionizing America's Cloud Computing the Pivotal Role of AI in Driving Innovation and Security. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *2*(1), 239-240.

[26]. Sanchez-Acedo, Alberto, Alejandro Carbonell-Alcocer, Manuel Gertrudix, and Jose Luis Rubio-Tamayo. "Revealing trends in academic publishing on immersive journalism through a dataset analysis of metaverse and extended technologies from 2017 to 2022." *Data in Brief* 54 (2024): 110263.

[27]. Shandler, R., & Canetti, D. (2024). Introduction: Cyber-conflict–Moving from speculation to investigation. *Journal of Peace Research*, *61*(1), 3-9.

[28]. Singla, A. (2024). Cognitive Computing Emulating Human Intelligence in AI Systems. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *1*(1).

[29]. Shuford, J. (2024). Unveiling the Power of Deep Learning: Insights into Advanced Neural n Network Architectures. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *3*(1), 1-14.

[30]. Sonko, S., Etukudoh, E. A., Ibekwe, K. I., Ilojianya, V. I., & Daudu, C. D. (2024). A comprehensive review of embedded systems in autonomous vehicles: Trends, challenges, and future directions. *World Journal of Advanced Research and Reviews*, *21*(1), 2009-2020.

[31]. Althati, C., Tomar, M., & Shanmugam, L. (2024). Enhancing Data Integration and Management: The Role of AI and Machine Learning in Modern Data Platforms. Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023, 2(1), 220-232.

[32]. Tillu, R., Muthusubramanian, M., & Periyasamy, V. (2023). Transforming regulatory reporting with AI/ML: strategies for compliance and efficiency. Journal of Knowledge Learning and Science Technology ISSN: 2959-6386 (online), 2(1), 145-157.

[33]. Jeyaraman, J., & Muthusubramanian, M. (2023). Data Engineering Evolution: Embracing Cloud Computing, Machine Learning, and AI Technologies. Journal of Knowledge Learning and Science Technology ISSN: 2959-6386 (online), 1(1), 85-89.

[34]. Ekakitie, E. (2024). Innovative Application of Juniperus Communis Wood Oil in Acne Skincare:: Analyzing Its Antimicrobial Properties. Journal of Knowledge Learning and Science Technology ISSN: 2959-6386 (online), 3(2), 253-262.