CHAPTER 5
Nurturing Research Competence and Excellence

Noor Lide Abu Kassim & Mohammad Tariqur Rahman

Introduction

The responsibility for creating and disseminating knowledge has long been placed on higher education institutions, particularly universities. Given this obligation, universities are frequently evaluated based on their capacity to secure grants, conduct research and disseminate knowledge to benefit human welfare and development. Therefore, university students, particularly those required to conduct research as part of their study programme, are expected to be competent in research. This means that they must be equipped with the necessary knowledge, skills, abilities, and attitudes to perform research successfully. Unsurprisingly, one course that is given much emphasis in postgraduate programmes is research methodology, which develops the much-needed competency in research. From master's to doctoral programmes, research methodology courses are a must. However, these research methodology courses, more often than not, focus on technical skills and methodologies with little emphasis on issues related to morality and ethical standards.

It must be kept in mind that competency in conducting good research, writing, and disseminating its findings is not limited to knowledge, practical skills, and abilities. At the heart of good research is sound, firm ethical judgement and practice. Without research competency, we will kill science through ineptness. Without good ethical conduct, we will not only kill science but eventually destroy mankind. It is only with both

technical know-how and sound ethical conduct that responsible research can be achieved, and mankind can truly prosper.

This chapter discusses what research competence means and the foundations of research competence. It is followed by a discussion on the branches of philosophy, research paradigms, and ethical standards that must be developed along with research competency so that real science and responsible research can thrive for the development and survival of mankind.

Research Competence

No one is a born researcher. A talented and ethical researcher can only be nurtured by developing research competency, the right philosophical basis, good ethical standards, creativity, innovativeness, inquisitiveness, and a sense of responsibility for society. Research competency can be achieved, among others, through formal training, proper guidance from faculty members and the supervisor, and enhancing research skills through hands-on technical training and practice. On the other hand, the right philosophical basis, creativity, innovativeness, inquisitiveness, good ethical standards and a strong sense of responsibility have to be nurtured through proper guidance, mentoring, and fostering core values and compassion for others.

What is research? To understand what research competence is, we first need to understand what research and research work mean. Briefly, research is a process of systematic inquiry using objective inductive and deductive methods to describe, explain or predict a certain phenomenon in order to understand it. John W. Creswell (2008) defines research as "a process of steps used to collect and analyse information to increase our understanding of a topic or issue" (Creswell, 2008, p.14). Research work can then be described as "an active process of systematic and deliberate knowledge of objective reality that uses scientific methods and means, and which ends with the formation of knowledge about the object" (p. 4). It is considered a fundamental human endeavour to fulfil the need for knowledge.

What is competence? The notion of competence was first proposed by Noam Chomsky, a renowned linguist, in 1965 to explain the theory of language and how competence is related to

language use or performance (Prokhorchuk, 2014). Competency can be briefly explained as the ability to use specific knowledge, skills, abilities and dispositions to perform a specific task. Research competence is often characterised as the ability to apply knowledge, skills, and abilities to carry out and complete a research activity successfully.

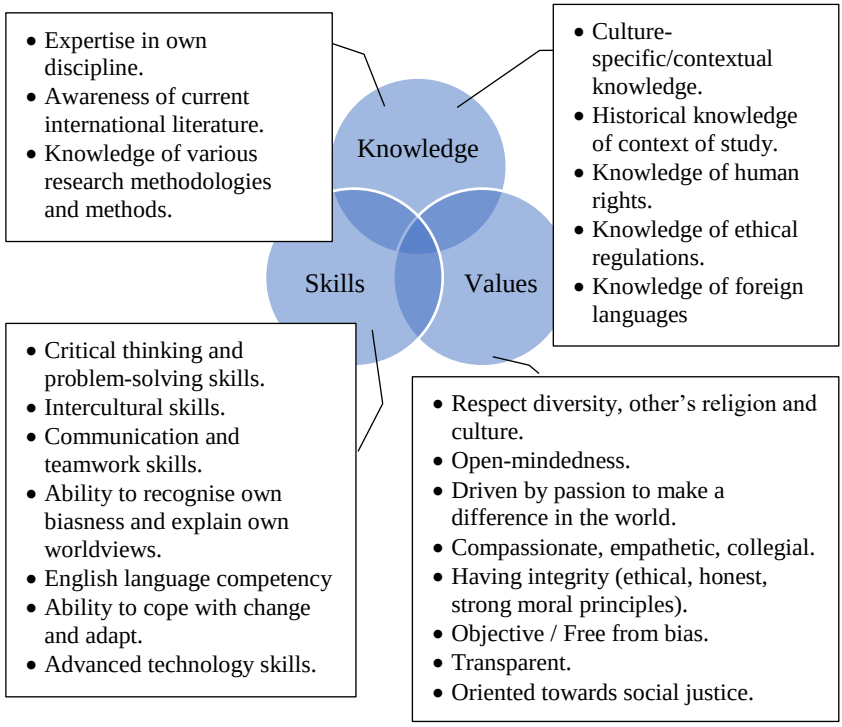
Niemczyk (2018) discussed the research knowledge, skills, and values that globally competent researchers (GCRs) need to engage ethically and competently in research across countries and research communities. From her study, the following are highlighted as aspects that are critical for competent global researchers:

- Awareness of the wider world, diverse cultures, social norms and worldviews.
- Awareness of global issues and the complexities of different contexts and their impact on education
- Interest in conducting research with global relevance and not only local importance.
- Interest in the exchange of perspectives, experiences and practices.
- Ability to initiate and maintain multicultural and multidisciplinary networks.
- Ability to conduct quality, ethical research in different contexts.
- Ability to share results/findings internationally.
- Ability to critically read research reports from different contexts
- Tolerant of differences, values diversity, and is "outraged by social injustice."
- Possess strong knowledge and skills in different research methodologies.

These specific knowledge, skills, and values are presented in Figure 1. It is evident that the role of values in research competency has come to the forefront and is acknowledged as a vital element of research competency. Respect for religious and cultural diversity, high ethical standards, honesty, objectivity,

compassion, open-mindedness, transparency and strong moral principles are among the values of a competent researcher.

Figure 5.1.
Knowledge, skills and values of globally competent researchers.



Note. Reproduced from Niemczyk, E.K. Article titled, Developing globally competent researchers: An international perspective (p. 117). From https://core.ac.uk/download/pdf/268425229.pdf

Philosophy and Research Paradigms

Why do researchers conduct research? How does one decide what kind of research is important or necessary? Is it to find truth in nature? Or is it for the survival of mankind? Or is it for the

betterment of the community? To answer these questions, it would be helpful to understand philosophical issues about research, as these influence the worldview or paradigm that one chooses to direct their investigations.

Philosophy and Its Branches

Both philosophy and research paradigm form the foundations of any research, regardless of whether they are explicitly articulated or not. They direct its motivation and directly influence the purpose, approach taken, data collection methods, data analysis techniques and the interpretation of the results. This is because our philosophy determines our worldview and the actions we take. Based on our philosophy, the paradigm that we choose to underlie our research is determined. Frequently, researchers are unaware of how their research relates to their worldview. Regardless, it is present in the subconscious mind and guides our choices in selecting the right research topic through logic and beliefs.

The Encyclopedia Britannica states that philosophy comes from the Greek word "philosophia", which means "love of wisdom". Philosophy examines "the rational, abstract, and methodological consideration of reality as a whole or of fundamental dimensions of human existence and experience". Simply, philosophy can be defined as the pursuit of wisdom, truth, and knowledge (Metcalf, 2020). Philosophy is generally described as having four main branches: logic, metaphysics, epistemology, and axiology.

Logic, the easiest to explain and understand, is a branch of philosophy that systematically and orderly examines ideas. It is Greek for "reasoning". Questions such as what would be acceptable for forming thoughts, conclusions, opinions, insights and judgements are central to the study of logic. In research and learning, two main types of reasoning or logic are commonly used: deductive and inductive reasoning. Deductive reasoning is top-down reasoning, where it begins from general ideas to specific conclusions. It is commonly associated with quantitative research, where, based on specific theories, hypotheses are formulated. They are then tested using empirical procedures. An example of deductive reasoning is as follows:

Major premise: All human beings need oxygen.
Minor premise: Ali is a human being.
Conclusion: Ali needs oxygen.

Inductive reasoning, conversely, starts with specific observations and ends with a general conclusion; hence, it is often referred to as a bottom-up approach. From specific observations, a pattern is identified to make a generalisation, which is used to lay down the foundations of a theory. Theories from inductive reasoning methods are commonly known as grounded theories. It is important to remember that the validity of the conclusion derived through inductive methods depends heavily on the completeness of the observations, as incomplete observations may arrive at the wrong or inconclusive conclusions.

This can be explained by giving the example of the theory of evolution through natural selection, which was proposed by Charles Darwin in 1859 in his book The Origins of Species. From his observations of how the beak shape of finch species on the Galapagos Islands varies, Darwin proposed the idea of natural selection. Scientists later supported this idea by suggesting that complex living systems evolved from a single self-replicating cell that came into being billions of years ago, as the earth and the universe formed and evolved from the time of the Big Bang. Until today, many scientists have argued that no real concrete evidence supports this theory.

Though many scientists have supported the theory of evolution through evidence of genetic mutations and fossils, it is a theory that is still being disputed. According to mathematical logicians, some scientists have debated its credibility due to the lack of empirical evidence of transitional species and the fact that the complexity of living systems could never evolve by chance. Hence, due to the lack of complete evidence, evolution will remain a debatable theory, much less a scientific fact.

The second branch of philosophy is metaphysics. Metaphysics comes from Greek, which means ‘those after the physics’. It is the branch of philosophy that examines the fundamental nature of reality, for example, the nature of time, space and causality. Ontology, an important sub-branch of metaphysics, examines the nature and meaning of existence, which cannot be explained using scientific rules of observation.

This branch of philosophy examines ideas and reality beyond the physical world as we perceive it through our senses. As Muslims, this is important because how Islam explains the existence of life, the purpose of life, and the existence of the Almighty is undoubtedly different from those who explain life through scientific observations, which we know are limited by human perception and ability and therefore are not absolute. This is evidenced by continuously breaking down of "truths" as and when new findings come to light.

From the Islamic perspective, evolution, as postulated by Darwin and Darwinism theories, is rejected, as evidenced in the Holy Quran, where it is revealed that Man is created by Allah, beginning with Prophet Adam AS. Allah has given Man eloquent speech, amongst other traits and attributes (Al-Quran, Surah Ar-Rahman; Verses 1-4). Man did not exist through the evolution process and natural selection. Hence, for Muslims to adopt the idea of natural selection and evolution as postulated by Darwinism would be a philosophical contradiction.

The third branch of philosophy, which is very much related to research methodology, is epistemology. The Greek word episteme means "knowledge' and logos means "the study of". Epistemology deals with what can be counted as knowledge, how people know what they know, and how they come to know what they know. It also examines what can be considered meaningful, justifiable evidence or insight instead of belief and opinion. In other words, epistemology concerns the theory of knowledge, how knowledge is known and its sources.

The fourth is axiology. The word axi in axiology, which means "value" or "worth", is concerned with examining values such as good or bad, moral or immoral. It deals with questions of what counts as fundamental values and what is or should be the role of values. Taken in the context of research, axiology would pertain to ethical issues that should be used to guide our conduct of research in terms of moral obligations of human endeavours, consequences of the research, and truth and fairness in drawing conclusions from the research (Kivunja & Kuyini, 2017).

Our philosophical standpoint (worldview) influences what research is acceptable or considered necessary; whose viewpoint/s is/are important to be elicited; the type of data needed,

the method/s of data collection, the method/s of analysis; interpretation of results of data analysis and the consequences of the findings to the society and status quo. Hence, it is not excessive to say that everyone involved in research should learn and have a firm understanding of these branches of philosophy and how they influence the motivation and direction of our research endeavours. Table 5.1 shows how the Islamic worldview differs from the Mainstream Scientific worldview.

Research Paradigms

Fundamentally, a paradigm is a way of looking at and understanding something based on a particular worldview, set of ideas, or perspectives. A research paradigm is a framework that explains our beliefs and assumptions and guides the theories we select, the research methods we adopt and the interpretations we make. A research paradigm is essential in the conduct of research, but it can be difficult to comprehend. As aptly described by Kivunja and Kuyini (2017), the concept of research paradigm is one that is elusive to many postgraduate students and new researchers. As the research paradigm is steeped in the realm of philosophy, it cannot be easily grasped without a thorough understanding of philosophy, its branches and sub-branches. Table 2 shows the most common research paradigms in relation to Ontology, Epistemology, Methodology and Axiology.

Kivunja and Kuyini (2017) quoted Lather (1986), stating that a research paradigm "constitutes the abstract beliefs and principles that shape how a researcher sees the world, and how s/he interprets and acts within that world. It is the lens through which a researcher looks at the world. It is the conceptual lens through which the researcher examines the methodological aspects of their research project to determine the research methods that will be used and how the data will be analysed." (p.26). Every researcher has his or her own worldview or philosophy that determines the motivation and direction of his/her research as s/he perceives the world. Hence, it is important that this worldview is made clear when describing the research.

Table 5.1.
Difference between the Islamic and Mainstream Scientific Worldviews

Branches of Philosophy	Islamic Worldview	Mainstream Scientific Worldview
Metaphysics & Ontology (nature of reality/existence)	Allah Subhanahu wa Ta'ala is the ultimate Creator. The purpose of all creation is to worship Allah Subhanahu wa Ta'ala.	The Standard Model of the Big Bang Theory explains how the universe came into being billions of years ago. It is the most widely accepted theory currently. Evolution and the survival of the fittest through natural selection explain the existence of man and other forms of life. As these are not scientific facts, different theories may emerge to explain this cosmic phenomenon.
Epistemology (our ideas about what knowledge is and how we know what we know)	All knowledge comes from and belongs to Allah. Man attains knowledge through revelation, inspiration, and observation by Allah's leave. Allah is the ultimate truth.	Knowledge is gained through scientific/objective observations and logical reasoning. Unravelling truth through scientific methods is the only way to know what we know.
Axiology (examination of values and judgment)	Islamic values are based on revelations enshrined in the Holy Quran and the Sunnah of the Prophet.	Moral ethics are socially constructed; hence, they may change over time.
Logic	Logic cannot be used to contradict the laws of the Islamic Shari'ah as prescribed in the Holy Quran.	Arguments/conclusions can be supported through logical arguments.

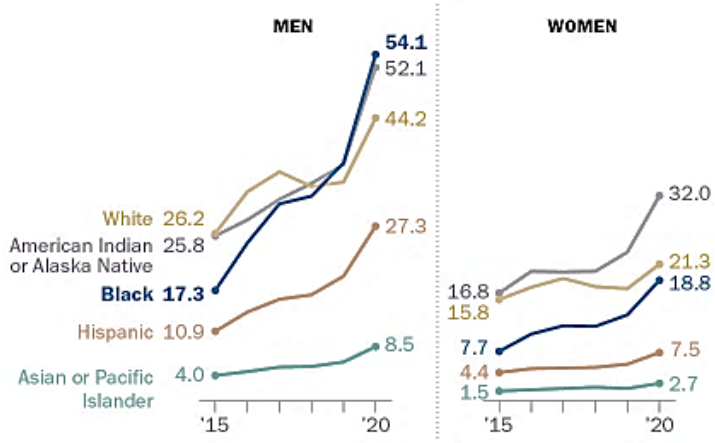
Unlike the conceptual framework, which provides a framework that organises the relationships among the variables addressed in a particular research, the research paradigm is a representation of the philosophical viewpoint of the research. It serves as the basis for the formulation of the statement of the problem, the research purpose, its objectives and questions, the selection of the approach and methods, and the way data is analysed and interpreted. Figure 5.2 demonstrates opposing paradigms at work in explaining how illicit drug use would impact human lives, the economy and society.

Figure 5.2.
Opposing outcomes of illicit drug use: An illustration of how different research paradigms influence the interpretation of societal well-being.

Note. Decriminalization of possession of drugs (does not include importation, production and supply). Source: Stevens A, Eastwood N, Douse K. (2024). In defence of the decriminalisation of drug possession in the UK. Drug Science, Policy and Law. 2024;10. doi:10.1177/20503245241239200

Drug overdose death rate among Black men in the U.S. more than tripled between 2015 and 2020

U.S. drug overdose death rate per 100,000 people, by race and ethnicity (age-adjusted)



Note. Source: Gramlich, J. (2022) Recent surge in U.S. drug overdose deaths has hit Black men the hardest. https://www.pewresearch.org/short-reads/2022/01/19/recent-surge-in-u-s-drug-overdose-deaths-has-hit-black-men-the-hardest/

Table 5.2
Comparison of the most common research paradigms in relation to Ontology, Epistemology, Methodology and Axiology.

Element	Positivism	Post-positivism	Constructivism	Interpretivism	Critical Theory	Pragmatism
Metaphysic / Ontology (study of nature of reality or being)	There is a single reality/truth that can be objectively and thoroughly discovered, observed and quantified. Deterministic in nature	There is a single reality or truth, but it cannot be perfectly apprehended. Reality can be discovered through experimentation/ observation to enable us to come to some conclusion, but that conclusion may need further verification through falsification.	Many relative realities. Reality is subjective and constructed through social interactions, and it is influenced by social, cultural and historical contexts.	Reality is subjective, and it is constructed within individuals. Each individual has "an innate capacity to intuit the meaning of being" (McManus, 2007, p.3). Individuals are experts in their own experiences, to which they attach subjective meanings and interpretations.	Reality is rooted in historical realism and emphasises the socially constructed nature of reality. Reality is influenced by power dynamics, including political, economic, cultural and social elements that can be oppressive and unjust.	There can be a single or multiple realities subject to empirical inquiry (Creswell & Plano Clark, 2011). Knowledge and reality are based on beliefs, habits, and human experience. They are socially constructed through human experience. Reality is negotiated and interpreted in terms of its usefulness to situations by integrating multiple views to produce the best outcomes.

Element	Positivism	Post-positivism	Constructivism	Interpretivism	Critical Theory	Pragmatism
Epistemology (study of the nature of knowledge and how we know knowledge)	Knowledge is gained through objective observation and measurement that can be replicated. Reality can be objectively known and measured using the right tools, which give reliable and valid results (etic perspective).	Knowledge is objective but may not be wholly comprehended due to limitations. It is influenced by the observer's values and experiences as the researcher determines what is essential to be studied and the methods to be used. This bias influences what they conclude about the real world.	Knowledge is co-constructed socially. Seeks how individuals construct their social, cultural and historical realities. Recognises the subjective and interpretive nature of knowledge creation. The purpose is to change the world.	Knowledge resides within the subjective experiences of individuals and the subjective meanings and interpretations they have of their personal experience (emic perspective). The purpose is to understand the world.	Knowledge is moulded by social structures and power dynamics. It combines theory and practice for the emancipation and transformation of reality, shaped by power dynamics and social construction. The role of the researcher is to reveal and challenge the power imbalances and injustices in human society.	Focus on the practicality and applicability of knowledge. Use of both objective and subjective approaches that are both theoretically sound and applicable to real-world settings. Integrate different qualitative and quantitative methods to address issues and interpret data. Utilise human experience as the principal means to build knowledge and understand the world.

Element	Positivism	Post-positivism	Constructivism	Interpretivism	Critical Theory	Pragmatism
Methodology	Knowledge is gained through objective empirical observation and measurement (quantitative methods and procedures).	Complete objectivity is impossible as value judgements are inherent in choices about what to study, methods to utilise for data collection and how data are analysed. Researchers' biases and the potential value of the research must be identified. Triangulation of quantitative and qualitative data is important to arrive at "objective" truths.	Constructivism seeks to understand the world and bring about positive social change by understanding the different realities of individuals/groups of individuals. It acknowledges the subjective and interpretive nature of knowledge creation. Knowledge is gained through qualitative, in-depth investigation of the insiders' perspective.	Interpretivism seeks to understand and interpret values and meanings present in the study context through the experience of individuals. Knowledge is gained by understanding the lived experience from the point of view of the individuals who live it through dialogical engagement and willingness to reformulate our understanding and admit the limitations of our own understanding.	Adoption of a reflective dialogic approach by combining observation and interview methods to question the status quo and to advocate change	Quantitative and qualitative approaches with mixed or multiple methods study designs

Note. The table was constructed based on various sources, mainly from Guraya, S.S., Harkin, D.W., Yusoff, M.S.B., and Guraya, S.Y. (2023). Paradigms unfolded – developing, validating, and evaluating the Medical Education e-Profesionalism framework from a philosophical perspective. In Frontiers in Medicine. Doi: 10.3389/fmed.2023.1230620. Based on Lincoln, Y.S., and Guba, E.G., (1985). Naturalistic inquiry. Thousand Oaks: Sage, 289-31.

Research Ethics

The World Health Organization states that "research ethics govern the standards of conduct for scientific researchers." Nowadays, research ethics approval in the conduct of research is required of institutions and researchers involved in research. The Research Ethics Review Committee is commonly set up to review research proposals involving human subjects and animal testing (in lab-based research) to ensure that the proposed research is conducted to the highest possible standards to protect human and animal life.

Research Ethics is rooted in the Declaration of Helsinki, developed by the World Medical Association (WMA) to guide medical research involving human subjects. The Declaration of Helsinki outlines the general principles in the conduct of medical research, risks, burdens and benefits, scientific requirements and research protocols, privacy and confidentiality, informed consent, use of placebo, post-trial provisions, research registration and publication and dissemination of results, unproven interventions in clinical practice, and the responsibilities and scope of the Research Ethics Committee (American Medical Association, 2013).

Shamoo and Resnik (2015), in their book titled "Responsible Conduct of Research", state the following topics that are fundamental for the conduct of ethical research and the dissemination of its results and findings:

- Misconduct in research
- Data acquisition and management
- Mentoring
- Collaboration within Academia and with Industry
- Authorship
- Publication and Peer Review
- Intellectual Property
- Conflicts of Interest and Scientific Objectivity
- The Use of Animals in Research
- The Protection of Human Subjects in Research
- Science and Social Responsibility

Research ethics covers a broad range of elements, from the actual conduct of the research to the dissemination of results through research publications and the social responsibility of researchers. In recent years, due to the pressure of university global ranking, issues related to research misconduct, unethical authorships, and retractions have plagued academia. It has been reported in Nature and several news media that Malaysia ranks sixth highest in retraction rates among countries, with more than 100,000 papers published in the last two decades. Malaysia has a retraction rate of 17.2 per 10,000 published papers (The New Straits Times, January 10, 2024). A critical factor in these retractions is not the lack of research competency but misconduct because of the lack of research ethics and integrity.

A related issue regarding unethical publications is the rise of dishonest authorship practices that give authorship to individuals who have no contributions to the research or the writing of the publication. Abu Kassim et al. (2024) showed that the co-authorship pattern in 4,561 indexed journals increased sharply in 2006, 2007, and 2008 due to the "publish or perish" policy of Malaysian universities. In reality, the number of papers throughout that period did not increase in tandem with the sharp increase in co-authorship.

Conclusion

Research competency and excellence come with having the proper knowledge, skills and attitude towards responsible research. Formal training can provide much-needed knowledge and develop the right research skills. However, proper mentoring and guidance from supervisors are crucial in developing budding researchers' right attitudes and ethical conduct. The chase for research excellence should not derail us from the primary purpose of higher education and research for the benefit of humanity.

References

Abu Kassim NL, Mohd Bakri SK, Nusrat F, Salim E, Manjurul Karim M, Rahman MT. (2024). Time-based changes in authorship trend in research-intensive universities in

Malaysia. *Account Res*. 2024 Dec;31(1):56-71. doi: 10.1080/08989621.2022.2094256. Epub 2022 Jul 5. PMID: 35758245.

American Medical Association. (2013). *World Medical Association Declaration of Helsinki Ethical Principles for medical research involving human subjects*. Retrieved from https://nih.gov.my/mrec/wp-content/uploads/2014/11/Declaration-of-Helsinki.pdf

Britannica, T. Editors of Encyclopaedia (2024, May 3). philosophy. *Encyclopedia Britannica*. https://www.britannica.com/topic/philosophy

Creswell, J.W. (2008). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. 3rd ed. Upper Saddle River, NJ: Pearson.

Creswell, J. W., & Plano Clark, V.L., (2011). *Designing and Conducting Mixed Methods Research*, 2nd ed. Thousand Oaks: Sage.

Ibrahim, A. H., & Baharuddin, M. (2017). Criticism of Darwin's Theory of Evolution by Muslim scholars**.** *Online Journal of Research in Islamic Studies*, *1*(1), 49–62. Retrieved from https://ijie.um.edu.my/index.php/RIS/article/view/9877

McManus, A. E., (2007). Interpretive Hermeneutic Phenomenology: Clarifying understanding. *Indo-Pacific Journal of Phenomenology*, *7*(2), 1-12

Niemczyk, E. K. (2018). Developing globally competent researchers: An international perspective. *South African Journal of Higher Education*. *32*(4), pp 171-185

Prokhorchuk, A. (2014). The definition of "research competence". National University of Life and Environmental Sciences of Dabil Ukraine, Kyiv, Ukraine. *Education Computer Science*, *1*(5), 439-443. Retrieved from file:///C:/Users/User/Downloads/The_definition_of_research_competen%20(2).pdf

Kivunja, C. & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education, 6*(5), 26-41.

Shamoo, A. E. Resnik, D. B. (2015). *Responsible Conduct of Research*. Oxford University Press. Retrieved from

https://global.oup.com/academic/product/responsible-conduct-of-research-9780199376025?cc=my&lang=en&

World Health Organization (2024). Ensuring ethical standards and procedures for research with human beings. Retrieved from https://www.who.int/ activities/ensuring-ethical-standards-and-procedures-for-research-with-human-beings 5 June 2024.