

Using Custom AI Tool to Support Novice Researchers' Philosophy and Paradigm Decision-Making

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Abstract: This study aimed to gain understanding of acceptance of the Research Philosophy Predictive (RPP) application by post graduate educators using the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The RPP is a novel Artificial Intelligence (AI) based model developed using machine learning (ML) and natural language processing (NLP). The RPP was developed with the purpose of assisting post graduate students with determining a research philosophy most aligned with their personal worldviews, beliefs and assumptions about the natures of reality and knowledge. It was pertinent to understand the adoption of the RPP from a teaching perspective. The UTAUT model, widely used for evaluating technology acceptance, was used as a theoretical framework in the current study through qualitative inquiry. Data was collected by means of semi-structured interviews from South Africa's National Research Foundation (NRF) rated educators from three universities in Gauteng province of South Africa. The UTAUT determinants of technology acceptance in the study are effort expectancy, performance expectancy, facilitating conditions, social influence and behavioural intention to use. Findings of the study revealed that positive feedback from educators in various research fields.

Keywords: Research Philosophy; Machine Learning; Natural Language Processing; Artificial Intelligence; Higher Education

1. Introduction

The rapid advancement of online and artificial intelligence (AI) technologies has transformed sectors such as healthcare, marketing, commerce, and education (Raffaghelli et al., 2022). Higher education has experienced significant adoption of these tools (Kizilcec et al., 2024; Zelelew et al., 2023), with chatbots streamlining administrative processes and reducing workloads (Chukwuere & Handoko, 2024). Generative AI tools like ChatGPT have also gained attention among research students (Kizilcec et al., 2024). The COVID 19 pandemic accelerated the use of digital technologies and learning management systems (LMS), enabling tools such as Early Warning Systems (EWS) to identify student challenges (Raffaghelli et al., 2022).

Beyond teaching support, AI can operationalise complex theoretical concepts relevant to knowledge creation (Nemorin et al., 2023). Research philosophy, a foundational yet challenging concept for many students (Sun & Zuo, 2024; Brown & Dueñas, 2019; Matthews, 2022), is one such area. Mkansi and Mkalipi (2023) developed the Research Philosophy Predictive (RPP) model, a machine learning tool that analyses textual input to recommend aligned research philosophies. This study examines acceptance of the RPP model and its teaching implications using the Unified Theory of Acceptance and Use of Technology (UTAUT).

2. Literature Review

AI technologies such as chatbots, large language models (LLMs), and LMS platforms have increased interest in AI-enabled higher education (Chiara et al., 2022), particularly during the COVID-19 pandemic (Sayginer, 2024; Al-Rahmi et al., 2021). Institutions adopted virtual platforms to sustain teaching and monitor student engagement (Bayaga & Du Plessis, 2023). Machine learning has also been used to predict academic risks (Kuleto et al., 2021). While these technologies offer potential benefits, scholars emphasise that AI should primarily enhance teaching and learning (Kuleto et al., 2021; Zelelew et al., 2023).

Most AI applications focus on undergraduate teaching, with limited attention to postgraduate research. Existing tools often address administrative tasks or issues such as plagiarism, leaving gaps in research-specific support. Novice researchers frequently struggle with selecting appropriate philosophical stances (Sun & Zuo, 2024; Brown & Dueñas, 2019). Foundational texts offer guidance (Denzin & Lincoln, 2017; Saunders et al., 2016) but remain text-heavy, impractical and inaccessible for many students (Matthews, 2022). The RPP model addresses this gap by analysing users' views to generate ranked philosophical alignments (Mkansi & Mkalipi, 2023). While AI's transformative potential in education is widely discussed (Nemorin et al., 2023), the RPP model's impact and user acceptance remain unexplored.

Introducing new technologies may affect user experience and engagement (Raffaghelli et al., 2022). Scholars advocate collaborative approaches to avoid poorly implemented AI solutions (Nemorin et al., 2023). The UTAUT model offers a suitable framework for examining technology acceptance.

3. Theoretical Framework

This study engaged a modified UTAUT model to investigate acceptance of the RPP tool. UTAUT, developed by Venkatesh et al. (2003), is widely applied in qualitative and quantitative research and integrates several established theories. It provides a validated method for assessing emerging technologies (Bayaga & Du Plessis, 2023) and offers insights into factors influencing user acceptance (Xue et al., 2024). Key UTAUT constructs include ease of use, required effort, and intention to use (Nymberg et al., 2024). These were essential for understanding teachers' experiences with the RPP model and identifying areas for refinement (Xue et al., 2024; Abbad, 2021). Effort expectancy refers to perceived ease of use and influences behavioural intention (Nymberg et al., 2024). Performance expectancy concerns the extent to which users believe the system improves task performance (Bayaga & Du Plessis, 2023; Bramo et al., 2023). Behavioural intention reflects users' attitudes toward technology and predicts actual use (VanDerSchaaf et al., 2021).

4. Methods and Materials

The study followed phenomenology as a research approach, commonly used in qualitative research as both a methodology and research philosophy, and rooted in interpretivism (Johnson et al., 2020). The interpretivist stance assisted the study in minimising the limitations of UTAUT, often cited as the inability to capture personal user experiences, emotional reactions and enjoyment (Bayaga & du Plessis, 2023; Abbad, 2021). This study employed a qualitative research strategy using semi-structured interviews based on a modified UTAUT model and guided by questions relevant to the measured constructs, with allowance for follow up and confirmation seeking questions (Johnson et al., 2020) to guard against bias and ensure credibility. Additionally, the study achieved triangulation by leveraging multiple sources of knowledge provided by interviews in line with the finding of Merriam and Tisdell (2016).

4.1 Population and Sampling

Purposive sampling was used to invite highly acclaimed researchers from South African universities with National Research Foundation (NRF, 2026) ratings; (A) leading international researchers, (B) internationally acclaimed researchers and (C) established researchers spanning different fields of studies as well as lecturers of social sciences. NRF A and B participation was done to appreciate the criticality of philosophy across research domains and social sciences lecturers provided expert knowledge in philosophy pedagogy as well as confirmation and clarification of philosophical jargon and terminology.

4.2 Data Collection

Data was collected through interviews of the rated NRF researchers who responded in agreement to participate, conducted by two panel members from the study. Participants were assured of anonymity and informed the findings will be used for academic publications. Table 1 shows demographics of participants.

Table 1: Demographics of participants

University faculty/college	Field of study	Title	NRF rating	Participant designated code	University code
Human Sciences	Transnational Studies, History - Namibia, History - South Africa - 20th century	Professor	B	#P1	U1
Human Sciences	Neuroanthropology, Consciousness studies, Critical neuroscience, Historical anthropology, Jesus Christ - History, Shamanism	Professor	B	#P2	U1
Zoology and Entomology	Animal physiology, Behavioural ecology	Professor	A	#P3	U2
Geology	Precambrian geology, Carbon capture and storage, Sedimentology, Biogeology, Applied remote sensing	Professor	B	#P4	U2
Human Sciences	Human resource management	Professor	A	#P5	U2
Applied Mathematics	Information security and mathematical modelling	Professor	C	#P6	U2
Human Sciences	Philosophy of medicine, Philosophy of epidemiology, Philosophy of science, Epistemology, Metaphysics, Philosophy of law	Professor	B	#P7	U3
Applied Information Systems	Information systems, information systems security, and business analysis	Professor	C	#P8	U3
Human Sciences	Consumer intelligence and information systems, marketing strategies and buyer behaviour	Professor	C	#P9	U3
Human Sciences	Aspects of religion and African traditional religiosity	Professor	A	#P10	U3

As shown in Table 1, all the respondents were NRF rated university professors, suggesting a high degree of research and teaching experience. Additionally, 4 (four) of the participants were internationally renowned researchers, and 1 (one) was a top international researcher. This calibre of participants gave the study the highest degree of credibility due to their extensive research knowledge and experience. With 3 (three) participants from the human sciences, 1 (one) from zoology and entomology, and 1 (one) from geology, the results also indicated that the participants were drawn from a variety of university faculties or colleges.

4.3 Data Analysis

The study followed a thematic analysis of data, where the UTAUT constructs being investigated, that is effort expectancy, performance expectancy and behavioural intention served as themes.

Recordings obtained from interviews were transcribed using software soon after the interview, confirmed by each panel researcher and compared between panel researchers. Comparisons between each interview and the previous interviews were done for similarities and differences. Key quotes from participants' narratives obtained during interviews provided patterns which were manually coded and recoded under a relevant theme. The coding and recoding of data was performed after each interview.

5. Results

The aim of the study was to explore factors affecting the acceptance and adoption of the Research Philosophy Predictive solution among NRF rated researchers. To achieve this, the study evaluated effort expectancy, performance expectancy and behavioural intention as key themes based on a modified UTAUT model. A summary of key themes and their sub-themes are shown in Table 2.

Table 2: Summary of key themes and sub-themes

Key Themes			
Effort expectancy	<i>Views on the structure of the questionnaire</i> Questionnaire well designed, repetition validates to see consistency. Consistency is a prelude to validity of this index. Language can be made clearer	<i>Ease of taking the questionnaire</i> The navigation is well done, and the saving feature is good, then I would not have to start again if I stopped. The questionnaire is well designed.	<i>Thoughts on the structure of the report</i> Evaluation gives back 100% of personal understanding; terminology may be difficult to understand for natural sciences.
Performance expectancy	<i>Thoughts on the usefulness of the system</i> The system provides students with useful knowledge about research philosophies.	<i>Ideas on improvement of the questionnaire</i> Some of the questions pertaining to reality and world views should be made clearer.	<i>Ideas on improvement of the report</i> Reduce technical explanations about how the report was generated (decision trees and NLP)
Behavioural intention	<i>It would be a good idea to use the system for teaching about philosophy</i> The system will increase interest in philosophy, especially for natural sciences students.	<i>Working with the system would be a fun way of learning about philosophy</i> Online system makes it reachable by many; especially in the pandemic times; It is also a fun way of learning.	<i>Useful knowledge can be gained by using the system</i> Use of machine learning is interesting, modern and a good way of learning.

5.1 Theme 1: Effort Expectancy

Narratives of participants from professors provided a starting point for effort expectancy. To obtain a deeper meaning from participants, specific attention was paid to i) views on the structure of the questionnaire, ii) ease of taking the questionnaire and iii) value of the report as sub-themes.

5.1.1 Views on the Structure of the Questionnaire

Participants revealed that the structure of the questionnaire was well thought and fit for purpose. It was argued that the repetitive questions add a dimension to the system that sought to confirm consistency in answering questions to ensure validity. As a participant stated that "Consistency is a prelude to validity of this index." In addition, opinions were that the inclusion of open-ended questions contributed an extra facet of consistency, where users could express views in their own words. Aside from the questionnaire's design, views were expressed regarding its content related to the actual question and answer options. These views further expressed the complicated nature of the philosophical as stated by a participant that, "The questions are quite complicated; these are quite philosophical type of questions."

Participants recommended using more conventional or everyday language and clarifying some of the questions. Furthermore, it was mentioned that, from the standpoint of natural science, reality and worldview ought to be maintained apart and not included in the same question. As suggested by a participant, "Some questions are contradictory; reality and worldview are separate for natural sciences; create separate questions."

These views do not indicate an issue with the overall structure of the questionnaire but were rather suggestions for its improvement in terms of content and language.

5.1.2 Ease of Taking the Questionnaire

The largest contributing variables to effort required while gaining greater value from the system were the questionnaire's simplicity of use and the report's understandability. Majority of participants thought the framework of the questionnaire was well-designed. As alluded by one participant, *"The navigation is well done, and the saving feature is good, then I would not have to start again if I stopped. The questionnaire is well designed."*

It was further claimed that repeating questions would guarantee consistency and, hence, the reliability of the answers. Additionally, it was asserted that the questionnaire's length is manageable.

The recurring theme across universities was that improving user experiences and reducing the amount of work needed may be achieved by streamlining and clarifying question-and-answer alternatives. While suggestions for making the language used in the questionnaire clearer were again brought forward, it was also emphasised that it may be difficult to achieve this entirely. Assertions were that in dealing with the knowledge realm, a certain level of philosophical understanding is required.

5.1.3 Value of the Report

Regarding the report's value, participants emphasised that it was very engaging and yielded anticipated results that are consistent with an individual's worldviews. The outcome's provision as an index was praised since it provided more information than merely the prevailing ideology in the peripheral, which the researcher might investigate. The report's extensive and comprehensive material was said to be crucial in giving students the tools they needed to support their philosophical position throughout research.

Some participants accentuated that some scientific or technical elements in the report may make it more difficult to identify important information it provided, which would be detrimental to the endeavour. However, a strong view emerged in support of the scientific explanations, mainly from the natural science participants. Further suggestions were that the report could be customised for the respective fields of research. In line with the adaptive software development methodology, these recommendations provided a feedback loop of great importance for the continual improvement of the system.

5.2 Theme 2: Performance Expectancy

The departure points for performance expectancy are the factors that stemmed from participants narratives. Cross-analysis of results from the three universities focused on i) thoughts on the usefulness of the report, ii) ideas on improvement of the report, and iii) thoughts on improvement of the questionnaire.

In terms of performance expectancy, it was evident that the contributing factors were the quality of the questionnaire and the quality of information garnered from the report. These two contributing factors would influence a user's experience, and consequently, the willingness to use the system.

5.2.1 *Thoughts on the Usefulness of the Report*

Regarding the quality of the questionnaire, participants held slightly differing views. Some participants viewed the language used in the questionnaire as possibly complex for some students, while majority of participants expressed not having any issues or difficulties with the questionnaire. On a positive note, valuable suggestions for questionnaire simplification were provided for the specified issues. The implications from these views were that all participants valued the report as useful, only that certain aspects may need adjustments. Participants regarded the quality of the information from the report as a starting point to bridge the lamented lack of prescribed philosophy material. Participants further asserted the information in the report to be valuable and stated that it would greatly encourage an interest in philosophy among natural science research students.

Across all universities, it was unanimously affirmed that the information in the report was interesting, beneficial, and added value to the awareness related to philosophy for research students.

5.2.2 *Ideas on Improvement of the Report*

Ideas on improvement of the report followed its usefulness from sub theme 2.1. Across all universities, it was affirmed that the information in the report was interesting, beneficial, and added value to the awareness related to philosophy for research students. It was also emphasised across universities that omitting the scientific or mathematical explanations of decision trees and the breakdown of NLP would improve performance expectancy, since the report would be easier to understand.

5.2.3 *Thoughts on Improvement of the Questionnaire*

Participants' suggestions for enhancing the system questionnaire aligned with their opinions of the previous effort expectancy questions namely, to enhance the wording or phrasing of some questions and their content. Participants again stressed that some of the questions could be simplified and made clearer to improve the questionnaire:

"Some of the questions will need to be rephrased, for example. Truth, reality and worldview are not the same. The middle questions are a repetition and will discourage students." (Human Sciences Professor).

Furthermore, reality and worldview should be separated, *"Reality and worldview are not the same thing; truth and worldview are also not the same thing."*

A suggestion was also brought forward to update instructions for taking the questionnaire and state that there are no right or wrong answers since this is about the individual's worldview on knowledge and how to obtain that knowledge, *"Please say to people there are no right and wrong answers."*

5.3 Theme 3: Behavioural intention

In terms of the behavioural intention towards using technology, the point of departure was the factors derived from participants narratives. An in-depth analysis of behavioural intention was obtained with specific focus to i) it would be a good idea to use the system for teaching about philosophy, ii) working with the system would be a fun way of learning about philosophy; and iii) useful knowledge can be gained by using the system.

5.3.1 *It Would be a Good Idea to use the System for Teaching About Philosophy*

As it pertains to the factor, using the system to teach philosophy would be a good idea; it was asserted that the concept is sound and would be applicable to various academic disciplines and institutions. Affirmations from participants at the three universities corroborate this conclusion, with particular examples from some participants, who thought the initiative was excellent and lovely and offered useful philosophical information. One participant stating that *"This is very good; it's very good. Yeah, well it's a nice project."*

Participants stated that the approach would be most helpful for PHD students and would boost interest in philosophy among students studying natural sciences. According to these participants, the system may be utilised to evaluate the philosophical knowledge and proficiency of potential graduate students. The emerging theme was that participants were unanimous in their views that the system would be a good idea to teach about research philosophy. Of great interest was the view on the role it can play in bridging curriculum.

5.3.2 *Working With the System Would be a fun way of Learning About Philosophy*

With regards to the factor, useful knowledge can be gained by using the system, a common view was that it offers intriguing, useful, and advantageous knowledge that can enhance the curriculum. Participants mentioned that incorporating machine learning made the exercise feel more contemporary and, as a result, more engaging. Participants further viewed the exercise as not only captivating and advantageous but also enjoyable. It received acclaim for its capability to not only promote awareness in terms of philosophy but also to serve as a discussion forum for both students and educators. In all cases participants' attitude towards using the system was good with some offers of considerations for improvement.

5.3.3 *Useful Knowledge can be Gained by Using the System*

Finally, in terms of useful knowledge can be gained by using the system participants across universities were of the view that that the solution provides an enjoyable method for learning about philosophy, with potential enhancements to increase its enjoyment. The simplicity of use and the value of knowledge gained were identified as factors contributing to the system's effectiveness in making philosophy enjoyable to learn. The report's inclusion of decision trees and explanations of natural language processing was perceived as excessive from a social science perspective. Conversely, from a natural science standpoint, it was regarded as intriguing. In addition to the use of the system being both fun and interesting, it was praised for being online. It was asserted that being online makes it reachable by many during the pandemic. Similarly, the assertions participants provided confirmation of an eye-opening and value-adding system that provides an enjoyable and fun experience. Emphasis was also placed on the system being user friendly while providing beneficial knowledge.

6. Discussion

This section discusses the findings on the usability, relevance and importance of the system in broadening research philosophy in teaching and learning. To that end, the section presents the study's findings based on the UTAUT model as a measure of technology acceptance, from the perspectives of the rated NRF researchers.

6.1 Effort Expectancy

The study established that NRF-rated researchers across universities and fields of research were all in agreement that the system serves an important role in teaching about philosophy in research. The researchers also praised the system for being offered online, especially in the period of Covid-19 and its social restrictions and implications for teaching. These assertions were seen as contributions to online learning. According to the findings, NRF-rated researchers from the three universities concurred that the system plays a significant role in teaching philosophy in research contributing to recommendations to studies by Sun and Zuo (2024) and Brown and Dueñas (2019). The system's availability online was also commended by the researchers, particularly in light of the COVID-19 pandemic and its effects on education and social constraints. These claims were viewed as advances in online research education.

However, additional findings showed that certain aspects of the system, including the exercise to ascertain one's philosophy and the exercise's result, needed to be improved. These were supportive and helpful critiques that supported the system's continual improvement. An earlier study by Nemorin et al. (2022) mentioned the increase in AI technology quality, effectiveness, as well as usefulness and hence acceptance through the practices of user involvement and collaboration.

6.2 Performance Expectancy

The findings of the study highlight the system's role in enhancing philosophical understanding within research, particularly among NRF-rated natural science researchers who found machine learning and NLP both useful and engaging. This aligns with previous such as Matthews (2022), and Brown & Dueñas (2019), research suggesting that enjoying the learning process increases the perceived utility of knowledge, an important factor for natural science students who typically struggle with philosophical concepts.

Furthermore, social science researchers expressed enthusiasm for the system as a tool for curriculum enhancement and facilitating discussions on research philosophy, thus contributing significantly to the teaching of the subject. From a pedagogical standpoint, the system encourages students to reflect on their ontological, epistemological, and axiological beliefs, providing a structured framework for their research projects. This approach supports earlier research advocating for the establishment of research philosophy and worldviews at

the project's inception, clarifying research direction and informing knowledge generation assumptions (Sun & Zuo, 2024; Brown & Dueñas, 2019). Overall, the precision and relevance of the information regarding personal worldviews and beliefs were deemed crucial by NRF researchers, underscoring their importance in research.

6.3 Behavioural Intention

The solution was praised by the NRF-rated researchers as a great endeavour that would spark more interest in philosophy, according to findings. It was suggested that the system could be used to evaluate the philosophical knowledge and proficiency of potential research students. This was similar to recommendations by Matthews (2022) and Brown and Dueñas (2019) that there should be a course to bridge the lack of philosophy knowledge between the graduate and post-graduate level.

Further findings revealed that the system could be used to enrich the curriculum because it gives students engaging, practical, and advantageous information. Regarding the philosophy index report's scientific justification of mathematics and machine learning, the results were conflicting. The use of machine learning, according to the natural science researchers, made the exercise more contemporary and, as a result, more engaging, pleasurable, and entertaining. However, some social science researchers suggested that the scientific explanation be taken out of the philosophy index report because they believed it might be a barrier for students. Accordingly, depending on the area of study, the scientific explanation ought to be a system function that is optional. This finding aligns with the importance of personalising technology for better acceptance and adoption as noted in Bayaga and Du Plessis (2023) and Nemorin et al. (2022).

7. Limitations of the Research

Limitations to the study are mainly methodological and method-based in nature. The UTAUT model as a framework used in the study has critiques related to its simplicity and inability to garner user engagement and enjoyment (Bayaga & Du Plessis, 2023). The current study made attempts to ask questions related to enjoyment and engagement to minimise the limitation. Additionally, UTAUT does not take into consideration study and participants locations. The current study was conducted in the Gauteng Province of South Africa, a similar study elsewhere may yield different findings (Xue et al., 2024).

Furthermore, limitations brought on using interviews where another method such as focus group would have provided in-depth conversations and perspectives. Finally, a study by Nemorin et al. (2022) noted that behavioural intention may not translate to actual and continual use and recommended periodic assessment of use.

8. Conclusion

Leaps in AI technology has enable advancement and pedagogical progression in higher education. The meeting of AI technology and education should not be accidental collisions but rather planned convergences for the betterment of educators and students (VanDerSchaaf et al., 2021). The current study investigated the acceptance of the Research Philosophy Predictive application by for its role and relevance in teaching research philosophy. The UTAUT model coupled with a qualitative research strategy was employed to attain in-depth understanding of the RPP acceptance from expert NRF researchers and educators' perspective. Findings from the study have theoretical implications for future research and practical implications for stakeholders in research education.

The study contributes to theory and literature in the provision of solid evidence to support the useful results of implementing AI in education, which is lacking according to Nemorin et al. (2022). Use the UTAUT common constructs on the basis of qualitative research revealed, deeper details on performance expectancy, effort expectancy and behavioural intention in an educational setting. A study by VanDerSchaaf et al. (2021) found the use of UTAUT with qualitative narrative to contribute greatly towards technology acceptance in higher education.

On performance expectancy, the usefulness of research philosophy knowledge gained from the system was found to be crucial in providing a framework and guidance to research adding a dimension of knowledge expectancy. Compatibility and online accessibility were revealed as having a great impact on the ease of use and hence effort expectancy. The RPP's engaging, practical, and advantageous properties were found to contribute greatly to behavioural intention from users. Findings from Nemorin et al. (2022), that engagement and enjoyment positively influence behavioural intention. The practical implications are immense for educators guiding postgraduate research students at the onset of their scientific inquiry journey. The use of the RPP for

prospective researchers' assessment on their research philosophy knowledge was found to be a gateway to bridge to knowledge creation.

Data Availability Statement

The data is not publicly available due to confidentiality issues but can be available upon reasonable request from the corresponding author.

Ethics Statement

The study was approved by UNISA College of Economic and Management Sciences Research Ethics Review Committee (2016_CRERC_009(FA)). A consent request to use collected data for research and publication was sent with invitations to participate and confirmed before participation.

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Conflict of Interest Disclosure

All the authors have no conflicting interest to declare.

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