

Ethical challenges in robotic process automation and its implications on the teaching and learning of courses in tertiary institutions

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ABSTRACT:

The study examined the ethical challenges in robotic process automation and its implications on the teaching and learning of courses in tertiary institutions. The descriptive research design of the survey type was used in this study. The population for the study comprised of all Business Education students from EKSU, BOUESTI and FUOYE and 18 lecturers. The sample for the study consisted of 206 respondents selected using stratified sampling techniques. A self-designed questionnaire titled "Ethical Challenges in Robotic Process Automation (ECRPAQ)" was the instrument used for the study. The findings indicated that there is no significance relationship between ethical challenges of robotic process automation and the level of its availability in tertiary institutions, its usage for teaching and learning and its impact on the teaching and learning of courses in tertiary institutions. The study recommended that there is an urgent need for increased investment in RPA infrastructure and resources. Also, institutions should explore implementing other RPA tools such as automated grading systems, virtual tutors, and course management systems. Institutions should develop and implement comprehensive RPA education programs. These programs should cover both technical skills and ethical considerations, ensuring students are well-prepared for the challenges and opportunities of RPA in various sectors.

Keywords: *robotic process, automation, implications*

INTRODUCTION:

Automation has been the focus of attention in a number of human activity domains in recent years, which has had a profound impact on the operational modalities of several sectors, including healthcare, finance, manufacturing, and, more critically, education. Higher education institutions are key players in the educational sector where automation can result in significant transformations by improving learning experiences, streamlining administrative tasks, and facilitating data-driven decision-making processes (Smith and Anderson, 2020). The use of automation technologies in higher education offers an unrealized potential to facilitate seamless administrative processes and improve educational outcomes.

Robotic Process Automation (RPA) is a technology application that facilitates the execution of operations in pre-existing applications, data

selection, interpretation, manipulation, and communication with other digital systems utilizing computer software or a digital "robot" configuration within the organization (Kaya, Türkyılmaz & Birol, 2019). According to Syed, Suriadi, Adams, Bandara, Leemans, Ouyang, & Reijers (2020), RPA is the most effective means for organizations to boost their operational efficiency. RPA robots can gather data, execute applications, trigger responses, make decisions based on predetermined rules, and interact with other systems (Kaya et al., 2019). Generally speaking, RPA solutions can be viewed as a virtual robotic workforce whose operational management is handled by the pipeline (supported solely by IT). When developing an RPA project, it combines well-understood technical skills with the ability to quickly understand business processes in terms of inputs, outputs, and decision points. RPA offers businesses improved process documentation,

lower error rates, and better report quality in addition to cost reductions (Kokina & Blanchette, 2019).

RPA can improve administrative procedures, give opportunities for future skill development, and enhance the teaching and learning experience in tertiary education. However, it also presents some issues that need to be carefully considered. RPA can improve the delivery of teaching in several ways, including the use of intelligent chatbots that can be deployed to provide immediate answers to student inquiries, help with course selection, and provide personalized learning recommendations. These bots can free up faculty members' time so they can concentrate on higher-value activities like teaching.

RPA can minimize administrative costs and increase efficiency by streamlining administrative procedures in postsecondary educational institutions. For example, RPA may automate grading, scheduling, student enrollment, and academic record management, among other mundane administrative duties. Staff members may now devote more time to research, curriculum development, and student assistance (Demirtaş & Selçuk, 2020). Additionally, RPA technology can help students have more individualized learning experiences. To deliver individualized learning materials and adaptive tests, intelligent learning systems may examine individual student data, including performance, learning preferences, and progress. By encouraging customized learning pathways that address each student's particular requirements, this strategy maximizes students' educational experiences (Ferreira & Teixeira, 2019).

Even while RPA can automate some jobs, it also raises the need for new skill sets. Higher education institutions should see this as a chance to modify their courses and provide students the tools they need to succeed in an automated job. Students may be prepared to work with and manage RPA technology by emphasizing skills like creativity, critical thinking, problem-solving, flexibility, and complicated reasoning. The ethical ramifications of RPA in education must be addressed by postsecondary establishments. For instance, privacy, fairness, and prejudice are issues when using data analytics to measure student performance. According to Rojko (2017), educational institutions must set explicit rules and regulations to safeguard student information,

guarantee algorithmic openness, and reduce the possibility of bias in automated decision-making.

The workforce in postsecondary institutions may be impacted by the use of RPA technology. Certain administrative jobs can become obsolete, necessitating the retraining or upskilling of impacted staff members to take on new responsibilities brought about by the deployment of RPA. According to Vander (2019), tertiary institutions have to adopt a proactive stance by providing staff members with training programs and assistance in order to facilitate the transition smoothly. RPA opens up new possibilities for tertiary institutions' research and innovation. Students and faculty members can investigate the potential uses of RPA in many fields, advancing the discipline. This promotes technology developments in education by providing chances for cooperation between government agencies, business, and academia (Zhang, Hong & Palvia, 2020).

The adoption of robotic process automation (RPA) in tertiary institutions can have a significant impact on the way courses are delivered. One of the main benefits of RPA is the potential for increased efficiency in administrative tasks, such as student enrollment, grading, and record-keeping. However, while RPA offers many benefits, such as increased efficiency, reduced errors, and cost savings, it also raises numerous important ethical challenges that need to be carefully considered, especially in the context of teaching and learning within tertiary institutions. Faculty members may have more time to devote to course design, content creation, and face-to-face interactions with students if these kinds of responsibilities are automated (Moffitt et al., 2018).

In addition, RPA can facilitate more customized and flexible learning experiences for students. For instance, automated bots can be employed to offer tailored learning materials, monitor student progress, and provide personalized feedback (Kokina & Blanchette, 2019). This could result in better learning outcomes and higher student satisfaction. As RPA becomes more common in the workforce, higher education institutions will need to modify their curricula and course content to make sure students are adequately prepared for the changing labor market (Lacity & Willcocks, 2016). This may entail integrating RPA-related concepts, abilities, and ethical considerations into pertinent

courses like computer science, business, and public policy.

Although using RPA in higher education can have numerous advantages, there are a number of issues and concerns that must be taken into account. In order to guarantee that faculty members are capable of navigating the hurdles presented by RPA and successfully integrating it into their teaching methods, postsecondary institutions need to offer them extensive training and assistance (Moffitt et al., 2018). In the context of teaching and learning, the use of RPA brings significant ethical considerations that need to be carefully explored, including job displacement, prejudice, and lack of transparency (Kokina & Blanchette, 2019).

Robotic process automation (RPA) has the potential to have a significant impact on the teaching and learning of courses in tertiary institutions. However, as RPA technologies continue to evolve, tertiary institutions will need to maintain a flexible and adaptable approach to curriculum development and teaching methods in order to remain relevant and responsive to the changing needs of students and the job market. Concerns about the potential impact on student engagement and the overall learning experience may arise due to the increased use of automation in administrative tasks and course delivery (Lacity & Willcocks, 2016). Therefore, institutions must make sure that the benefits of RPA do not come at the expense of meaningful interactions and personalized support for students. While individualized learning experiences and greater efficiency are two advantages of RPA, there are also significant issues and difficulties that need to be properly taken into account. When it comes to integrating RPA, tertiary institutions need to be proactive and purposeful, making sure that it serves the interests of students, teachers, and the community at large as well as their own educational objectives.

Statement of the Problem:

While there are many advantages to robotic process automation (RPA), including improved productivity, decreased errors, and cost savings, there are also important ethical considerations that need to be made, particularly when it comes to teaching and learning in higher education. RPA has the potential to replace human workers, which could have negative effects on the labour market and society, especially for those with lower skill levels.

Additionally, because RPA systems are created and maintained by humans, their biases may be inherited or even amplified. This may lead to biased or unjust decision-making, which would have detrimental effects on academic advising, grading, and student admissions, among other things.

Even with the advantages that automation technologies offer, higher education establishments are slow to completely embrace new developments. This is mainly because of worries about data security, the high cost of implementation, loss of jobs, and overall resistance to change. Furthermore, there is a gap in the corpus of information currently available due to the glaring lack of empirical research defining the practical uses and ensuing advantages of automation in a higher education environment. These moral dilemmas have a big impact on how courses are taught and learned at postsecondary institutions. As RPA gains traction, educational institutions will need to modify their curriculum to better prepare students for the rapidly evolving workforce. This will involve introducing RPA-related concepts, abilities, and ethical issues into pertinent courses. Furthermore, professors and students may need to acquire new skills and modify their teaching strategies in order to implement RPA in administrative activities. Therefore, the goal of the study is to investigate the moral dilemmas raised by robotic process automation and how they may affect tertiary institution courses and teaching and learning.

Purpose of the Study:

The purpose of this study is to identify the ethical challenges in robotic process automation and its implications on the teaching and learning of courses in tertiary institutions. Specifically, the study:

- i. examined the level of availability of robotic process automation in tertiary institutions;
- ii. examined the level of usage of robotic process automation for teaching and learning of courses in tertiary institutions;
- iii. determined the impact of robotic process automation on the teaching and learning of courses in tertiary institutions;
- iv. identified ethical challenges of robotic process automation on the teaching and learning of courses in tertiary institutions.

Research Hypotheses:

The following null hypotheses were formulated to guide the study

- i. There is no significant relationship between the ethical challenges of robotic process automation and the level of its availability in tertiary institutions;
- ii. There is no significant relationship between the ethical challenges of robotic process automation and its usage for teaching and learning of courses in tertiary institutions;
- iii. There is no significant relationship between the ethical challenges of robotic process automation and its impact on the teaching and learning of courses in tertiary institutions.

METHODOLOGY:

The study adopted a descriptive research design of the survey type. The population for the study comprised of all Business Education students from Ekiti State University (EKSU), Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti (BOUESTI) and Federal University Oye-Ekiti

(FUOYE)) and 18 Business Education Lecturers. The sample for the study consisted of 210 Business Education students and 10 lecturers. Stratified sampling techniques was used to select respondents across all level (100 to 400).

A questionnaire titled “Ethical Challenges in Robotic Process Automation (ECRPAQ)” was the instrument used to collect the data for the study. The reliability of the instrument was determined through test re-test method. The instrument was administered to 20 respondents in the population but outside the selected sample, the same instrument was re-administered within an interval of two weeks on the same set of students. The two scores were then correlated using Pearsons’ Product Moment Correlation, which yielded a reliability coefficient of 0.81 and this was adjudged reliable. The questionnaire was administered online through google form and sent to the respondents via their email and various social media platforms. Responses were collected via the researchers’ email for analysis. The data collected were analyzed using descriptive and inferential statistics.

RESULTS:

Research Question 1: What is the level of availability of robotic process automation in tertiary institutions?

Table 1: Descriptive analysis showing the level of availability of robotic process automation in tertiary institutions

S/N	ITEMS	N	MEAN	SD	REMARKS
1	Automated grading systems	206	1.27	0.62	Not available
2	Virtual tutors	206	1.98	0.90	Not available
3	Course management systems	206	1.57	0.95	Not available
4	Personalized learning pathways	206	1.97	1.19	Not available
5	Language translation services	206	2.12	0.84	Not available
6	Virtual reality simulations	206	2.37	1.03	Not available
7	Chabot for student support	206	2.41	0.99	Not available
8	Data analysis and insights	206	1.45	0.98	Not available
9	Automated lesson planning	206	1.87	0.91	Not available
10	Adaptive learning platforms	206	1.67	0.88	Not available

Mean cut off = 2.50

The level of availability of robotic process automation in tertiary institutions in Ekiti State was presented in table 1. Using the criterion mean score of 2.50 as cut-off to determine the availability of each item, it was indicated that all the items on the table were unavailable.

Research Question 2: What is the level of usage of robotic process automation for teaching and learning of courses in tertiary institutions?

Table 2: Descriptive analysis showing the level of usage of robotic process automation for teaching and learning

S/N	ITEMS	N	MEAN	SD	REMARKS
1	Automated grading systems	206	1.68	0.92	Not used
2	Virtual tutors	206	2.20	0.56	Not used
3	Course management systems	206	1.92	0.87	Not used
4	Personalized learning pathways	206	1.57	0.79	Not used
5	Language translation services	206	1.94	0.94	Not used
6	Virtual reality simulations	206	1.80	0.60	Not used

7	Chabot for student support	206	2.51	1.02	Used
8	Data analysis and insights	206	1.68	0.92	Not used
9	Automated lesson planning	206	1.20	0.56	Not used
10	Adaptive learning platforms	206	1.42	0.87	Not used

Mean cut off = 2.50

The level of usage of robotic process automation for teaching and learning of courses in tertiary institutions in Ekiti State was presented in table 2. Using the criterion mean score of 2.50 as cut-off to determine the usage of Robotic process automation, it was indicated that only item 7 (Chatbots for student support) was used by respondents for teaching and learning of courses in tertiary institutions in Ekiti State.

Research Question 3: What are the impacts of robotic process automation on the teaching and learning of courses in tertiary institutions?

Table 3: Descriptive analysis showing the impacts of robotic process automation on the teaching and learning of courses in tertiary institutions

S/N	ITEMS	Mean	SD	Remarks
1	Robotic process automation has improved the efficiency of administrative tasks related to course management, allowing educators to focus more on teaching and learning.	2.39	0.65	Disagree
2	RPA tools have enabled faster grading and feedback processes	2.40	0.81	Disagree
3	Automation of routine tasks through RPA has freed up time for educators to develop innovative teaching methods	2.48	0.68	Disagree
4	RPA has facilitated personalized learning experiences by automating the delivery of customized content to students	2.20	0.65	Disagree
5	The implementation of RPA in online learning platforms has enhanced accessibility and flexibility for students	2.09	0.75	Disagree
6	The use of RPA helps creation of interactive learning tools and simulations that enhance student engagement and understanding.	2.19	0.84	Disagree
7	The integration of RPA in educational institutions has fostered a culture of continuous improvement and innovation in teaching practices.	2.47	0.66	Disagree

N=206

Mean cut off = 2.50

The impacts of robotic process automation on the teaching and learning of courses in tertiary institutions was presented in table 3 and it shows that respondents disagreed that robotic process automation impact the teaching and learning of courses in tertiary institutions.

Research Question 4: What are the ethical challenges of robotic process automation in the teaching and learning of courses in tertiary institutions?

Table 4: Descriptive analysis showing the ethical challenges of robotic process automation in the teaching and learning of courses in tertiary institutions

S/N	ITEMS	Mean	SD	Remarks
1	The use of robotic process automation in education raises concerns about the potential loss of human touch	2.60	0.67	Agree
2	Implementing RPA may lead to job displacement for staff	2.40	0.67	Disagree
3	The reliance on RPA for decision-making in educational settings may raise concerns about bias and fairness in algorithms, potentially leading to unequal treatment of students based on automated processes.	2.59	0.49	Agree
4	The implementation of RPA in education may widening the digital divide between students who have access to technology and those who do not	2.79	0.41	Agree
5	Challenges may arise in determining the appropriate balance between automation and human involvement in teaching and learning	2.79	0.61	Agree

N=206

Mean cut off = 2.50

Table 4 revealed the ethical challenges of robotic process automation in the teaching and learning of courses in tertiary institutions. Using the criterion mean score of 2.50 as cut-off to determine the affirmation of each statement, it was agreed that the use of robotic process automation in education raises concerns about the potential loss of human touch, the reliance on RPA for decision-making in educational settings may raise concerns about bias and fairness in algorithms, potentially leading to unequal treatment of students based on automated processes, the implementation of RPA in education may widening the digital divide between students who have access to technology and those who do not and challenges may arise in determining the appropriate balance between automation and human involvement in teaching and learning. However, respondents disagreed that implementing RPA may lead to job displacement for staff.

Test of Hypotheses:

Hypothesis One: There is no significant relationship between the ethical challenges of robotic process automation and the level of its availability in tertiary institutions.

Table 5: Pearson’s Product Moment Correlation showing the Relationship between ethical challenges of robotic process automation and the level of its availability

Variables	N	Mean	Standard Deviation	r-cal	P-value
Ethical Challenges	206	13.74	1.49	0.096	0.062
Availability of RPA	206	18.68	1.55		

P > 0.05

Table 5 showed there is no significance relationship between ethical challenges of robotic process automation and the level of its availability in tertiary institutions ($p > 0.05$), with a correlation coefficient (r-cal) of 0.096, p-value = 0.062. Therefore, the hypothesis formulated which states there is no significant relationship between the ethical challenges of robotic process automation and the level of its availability in tertiary institutions is thereby accepted.

Hypothesis Two: There is no significant relationship between the ethical challenges of robotic process automation and its usage for teaching and learning of courses in tertiary institutions

Table 6: Pearson’s Product Moment Correlation showing the Relationship between ethical challenges of robotic process automation and its usage for teaching and learning

Variables	N	Mean	Standard Deviation	r-cal	P-value
Ethical Challenges	206	13.74	1.49	0.086	0.063
Usage of RPA	206	17.92	1.89		

P > 0.05

Table 6 showed there is no significance relationship between ethical challenges of robotic process automation and its usage for teaching and learning, with correlation coefficient (r-cal) of 0.086, p-value = 0.063 ($p > 0.05$). Therefore, the hypothesis formulated which states that there is no significant relationship between the ethical challenges of robotic process automation and its usage for teaching and learning of courses in tertiary institutions is therefore accepted.

Hypothesis Three: There is no significant relationship between the ethical challenges of robotic process automation and its impact on the teaching and learning of courses in tertiary institutions

Table 7: Pearson’s Product Moment Correlation showing the Relationship between the ethical challenges of robotic process automation and its impact on the teaching and learning

Variables	N	Mean	Standard Deviation	r-cal	P-value
Ethical Challenges	206	13.74	1.49	0.023	0.123
Impact of RPA	206	16.22	0.93		

P > 0.05

Table 7 showed there is no significance relationship between ethical challenges of robotic process automation and its impact on the teaching and learning of courses in tertiary institutions, with correlation coefficient (r-cal) of 0.023, p-value

= 0.123 ($p > 0.05$). Therefore, the hypothesis formulated which states that there is no significant relationship between the ethical challenges of robotic process automation and its impact on the teaching and learning of courses in tertiary institutions is therefore accepted.

DISCUSSION:

The study's conclusions showed that Ekiti State's tertiary institutions lacked robotic process automation. This result is consistent with wider patterns seen in underdeveloped nations, where higher education's use of technology frequently lags behind international norms (Adebayo & Ogunleye, 2023). These schools' lack of RPA resources could prevent students from being exposed to cutting-edge technology, which might affect their ability to compete in the global labour market (Johnson et al., 2022). Concerns over graduates' readiness for a workforce that is becoming more automated are also raised by this disparity in technology resources (Smith & Ojo, 2024). The results highlight the necessity of increasing funding for RPA training programs and infrastructure in Ekiti State's higher education institutions.

The results showed how much robotic process automation is used in Ekiti State's tertiary institutions for course teaching and learning. Consequently, it was found that there was very little use of robotic process automation, with the sole robotic process automation utilized for course teaching and learning in Ekiti State's tertiary institutions being "Chatbots for student support." The sole usage of chatbots points to a preliminary automation stage, with administrative assistance being the primary focus as opposed to direct educational applications (Johnson et al., 2022). This restricted application can be a sign of low understanding of RPA's wider educational potential or resource restrictions (Smith & Ojo, 2024).

The results also showed that robotic process automation had no effect on the way courses were taught and learned in Ekiti State's postsecondary institutions. This result is probably explained by the fact that RPA technologies are not readily available and are not used very often in these institutions. The lack of effect is consistent with studies showing the difficulties in integrating technology into higher education institutions in underdeveloped countries (Adebayo & Ogunleye, 2023). Institutions are unable to take advantage of potential advantages like increased administrative effectiveness and better learning opportunities because RPA is not being implemented. The results highlight the necessity of focused investments and policies to encourage the use of RPA in the postsecondary education sector in Ekiti State.

The implementation of robotic process automation (RPA) in higher education has raised ethical concerns about the potential loss of human touch, bias and fairness in algorithms, and the potential for unequal

treatment of students based on automated processes. It has also been found that expanding the digital divide between students who have access to technology and those who do not, as well as difficulties in striking the right balance between automation and human involvement in teaching and learning, are some of the issues raised by RPA in education.

The results showed that there is no significant correlation ($p > 0.05$) between the ethical concerns raised by robotic process automation and the degree of its availability in postsecondary educational institutions. These findings imply that the ethical worries about RPA, including algorithmic bias, privacy problems, and job displacement (Smith & Johnson, 2022), are not always connected to the technology's popularity in higher education environments. The small association ($r = 0.096$) suggests that there is no discernible effect of expanding RPA access in postsecondary institutions on student knowledge or involvement with its ethical issues. The notion that increased exposure to RPA in educational contexts results in improved ethical knowledge is refuted by this data (Lee & Park, 2021).

Robotic process automation's ethical concerns do not significantly correlate with its application in education ($p > 0.05$). These findings emphasize the necessity of purposefully include ethical conversations into RPA education, as exposure alone might not be enough to handle the intricate moral dilemmas this technology presents.

The study's final conclusion, with a correlation coefficient (r -cal) of 0.023 and a p -value of 0.123 ($p > 0.05$), indicated that there is no significant association between the ethical difficulties of robotic process automation and its effects on course teaching and learning in tertiary institutions. The lack of correlation indicates a pattern in which educational institutions are failing to modify their courses to incorporate moral reflection in addition to technical instruction, thereby equipping students for the challenging reality of deploying RPA across industries (Wong & Park, 2024).

CONCLUSION:

Based on the findings of this study, it was concluded that there is non-availability and minimal usage of RPA technologies in the teaching and learning of courses in tertiary institutions in Ekiti State. Also, the study concluded that there is no significance relationship between ethical challenges of robotic process automation and the level of its availability, its usage and its impact on the teaching and learning of courses in tertiary institutions in Ekiti State.

Recommendations:

Based on the findings of this study, the following recommendations were made.

Given the lack of availability of robotic process automation (RPA) in tertiary institutions in Ekiti State, there is an urgent need for increased investment in RPA infrastructure and resources;

Institutions should explore implementing other RPA tools such as automated grading systems, virtual tutors, and course management systems. This expansion would provide students with more exposure to cutting-edge technologies and better prepare them for an increasingly automated workforce;

Institutions should develop and implement comprehensive RPA education programs. These programs should cover both technical skills and ethical considerations, ensuring students are well-prepared for the challenges and opportunities of RPA in various sectors;

Despite the lack of significant relationship between ethical challenges and RPA availability/usage/impact, it is crucial to intentionally integrate ethical discussions into RPA education. This could involve case studies, guest lectures from ethics experts, and practical projects that consider both technical and ethical aspects of RPA implementation;

Institutions should develop strategies to ensure equal access to RPA technologies and education for all students, regardless of their technological background or economic status;

Development of guidelines and best practices for determining the appropriate balance between RPA and human involvement in teaching and learning processes.

Authors' Contribution:

1. OLANIYI, O.N – Conceptualized the study and drafted the manuscript.
2. OYEWOLE, S. O – Conducted data collection
3. OLUWAFEMI, P. A – worked on data analysis
4. ADEAGBO, S - Worked on data analysis
5. OLADEJI, A. D – Supervised the study and provided critical revision

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