



Research Based Learning and It's Influence on the Development of Critical Thinking among Students in Higher Education Institutions in Arusha Region, Tanzania

Loshilu Sambweti & Kennedy Omondi Otieno
St. Augustine University of Tanzania (SAUT), Arusha.
Email: sambweti77@gmail.com/omondiken2016@gmail.com

Abstract: This study assessed Research-Based Learning (RBL) and its influence on the development of critical thinking among students in higher education institutions (HLIs) in Arusha region. The study adopted Sequential Explanatory Design and mixed-methods approach. The objectives were to: assess barriers to RBL that affect the development of critical thinking skills among students in HLIs and propose strategies for improving RBL practices. Experiential Learning Theory guided the study. The target population consisted of 1,000 undergraduate, 600 postgraduate students & 34 lecturers. The sample size of 94 consisted of 14 lecturers selected purposively, 50 undergraduate and 30 postgraduate students selected by Stratified and simple random sampling methods. Data were collected using document analysis, interviews and questionnaires. Validity was established through expert judgment. Reliability of questionnaires for Likert-type items was determined after a pilot study & analyzed in Statistical Package for Social Sciences (SPSS) version 23 where Cronbach Alpha coefficient of $r=0.767$ was generated. Credibility of qualitative instruments was established through detailed reporting of the research process, peer debriefing and triangulation. Descriptive statistics & thematic analysis were adopted. Findings revealed that financial constraints, inadequate mentorship and limited time are barriers facing RBL. The study concludes that to nurture critical, autonomous, and solution-oriented graduates, HLIs should adopt a policy-driven and well-resourced Research-based learning RBL model embedded within a strong institutional research culture. The study recommends a curriculum that integrates research skills development from first year, increased budgetary allocation for research support, investment in digital infrastructure and formal training for supervisors tasked with mentoring student researchers.

Keywords: Research, Institution, Critical, Postgraduate, Arusha, Tanzania

How to cite this work (APA):

Sambweti, L. & Otieno, K. O. (2025). Research Based Learning and It's Influence on the Development of Critical Thinking among Students in Higher Education Institutions in Arusha Region, Tanzania. *Journal of Research Innovation and Implications in Education*, 9(4), 945 – 957. <https://doi.org/10.59765/pjdr6>.

1. Introduction

Students' ability encompasses a range of skills, including but not limited to critical thinking, problem-solving, comprehension, memory, creativity, and the ability to acquire and apply knowledge. The development of critical thinking among students is a critical aspect of Higher

Education, as it enables them to analyze information, evaluate evidence, and make informed decisions (Lugendo, 2022). However, the barriers to Research-Based Learning (RBL) in Higher Education Institutions (HLIs) hinder the development of Critical Thinking among students. The inability of students to engage in RBL limits their ability to develop critical thinking skills, such as analysis,

synthesis, and evaluation. A study by Mwakapina (2022) found that students who engaged in RBL demonstrated improved critical thinking skills compared to those who did not. Additionally, lack of RBL opportunities limits the ability of students to develop problem-solving skills, which are essential for critical thinking (Kapinga, 2020). According to a report by the Tanzania Commission for Universities (TCU), lack of RBL opportunities is a major challenge facing Higher Education Institutions in Tanzania (TCU, 2022).

Research-based learning is increasingly recognized as a vital pedagogical approach that fosters critical thinking skills among students globally. However, various barriers impede its implementation across HLIs worldwide. These barriers can include inadequate resources, insufficient training for instructors, and institutional resistance to change (Brew, 2020). The significance of RBL lies in its ability to engage students actively in the learning process, promoting analytical skills and independent thought (Healey & Jenkins, 2019). This cultural mindset can discourage both educators and students from embracing RBL methodologies, hence negatively affecting the growth of critical thinking among the students in HLIs. According to Komba (2021), lack of access to relevant research materials and equipment hinders the ability of students to engage in RBL for critical thinking. Similarly, shortage of resources, inadequate infrastructure, and insufficient trained personnel are some of the major barriers to RBL in HLIs in Arusha Region. Furthermore, the high student-to-teacher ratio in these institutions makes it challenging for teachers to provide individualized attention and guidance to students (Mwanga, 2020).

Many institutions struggle to provide students with the tools necessary for conducting meaningful research (Kibera & Mshana, 2025). This scarcity creates an environment where traditional teaching methods prevail over innovative approaches that promote active learning and inquiry. Additionally, there is a significant gap in faculty training and professional development regarding RBL methodologies. Education stakeholders often lack the necessary skills to effectively integrate research into their curricula (Nchimbi & Msuya, 2024). Consequently, many instructors may resort to conventional lecture-based teaching styles that do not encourage critical engagement or independent thinking among students. This is done in an attempt to evade several barriers facing research-based learning which plays a crucial role in the development of critical thinking among students in higher education institutions. Against this background, the present study investigated the influence of research-based learning on the development of critical thinking among students in higher education institutions in Arusha Region.

1.1 Research Questions

The study investigated the following research questions:

1. What are the barriers to RBL that affect the development of critical thinking skills among students in HLIs in Arusha Region?
2. What are the possible ways to improve RBL for the development of critical thinking among students in higher education institutions in the Arusha Region?

2. Literature Review

2.1 Theoretical Review

This study is anchored in Experiential Learning Theory propounded by Kolb in 1985.

2.2 Experiential Learning Theory (Kolb)

Kolb's Experiential Learning Theory, developed in 1985, proposed that learning occurred as a process whereby knowledge is constructed through the transformation of experience. The theory emphasized a cyclical model of learning that involved four key stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Within the context of RBL, this framework enabled learners to engage actively with research tasks, thereby facilitating the development of critical thinking through repeated cycles of experience, reflection, and action

2.1.1 Strengths of Adult Learning Theory

The theory promoted a holistic approach to learning by encouraging learners to participate in practical activities, reflect on their experiences, and apply newly acquired knowledge. As observed by Miettinen (2020), the theory underscored the importance of connecting academic learning to real-life situations, thereby enhancing the relevance and applicability of educational content to future professional contexts. This reflective and experiential approach was considered vital for nurturing learners' autonomy and critical thinking capabilities. It enabled students to take ownership of their learning processes by continuously evaluating and adapting their understanding through iterative cycles of reflection and application.

2.1.2 Application of Adult Learning Theory

In the context of RBL, Kolb's Experiential Learning Theory was operationalized through the design of assignments aligned with the experiential learning cycle. For example, students were encouraged to engage in practical research activities, such as data collection through surveys or experiments. These activities were followed by structured reflection sessions in which learners critically examined their findings, identified challenges encountered, and recognized gaps or uncertainties in their understanding. Based on these reflections, learners were expected to formulate new ideas or refine existing theories, which they then tested through revised research strategies or new investigative projects. This cyclical process facilitated a shift from theoretical understanding to practical application, thereby enhancing students' analytical, reflective, and problem-solving abilities.

2.2 Empirical Review

Research indicates that students who engage in RBL demonstrate superior critical thinking skills compared to their peers who do not participate in such activities.

2.2.1 Barriers to Research-Based Learning and their Effects on the Development of Critical Thinking Skills among Students in Higher Education Institutions

Johnson & Williams (2022) researched on Faculty Perceptions of Research-Based Learning: Challenges in Implementation in Republic of Saudi Arabia. A sample size of 500 faculty members from 10 universities was involved in the study. Cross-sectional survey was adopted, and data were collected using online questionnaire with established validity and reliability. The study also found that Faculty members cited heavy workloads, lack of time, and insufficient incentives for engaging in research-based teaching as significant barriers. There was also a noted lack of understanding of RBL methods.

A study was conducted in Canada by Green & Miller (2023) on barriers to research-based learning and its impact on critical thinking skills in university students. Longitudinal survey design was adopted in mixed methods that involved 200 students from 5 universities. Thematic analysis and paired t-tests analysis techniques were used to analyze data. The study found that barriers such as large class sizes and insufficient faculty training in RBL methods significantly hindered the development of students' critical thinking skills. Students in institutions with fewer barriers exhibited better problem-solving and analytical skills.

Furthermore, Komba (2021) researched on the influence of research on the development of critical thinking in higher education. The study collected both qualitative and quantitative data under mixed methods approach with 150 students (undergraduate and postgraduate) as the respondents. Research instruments included Pre-test and post-test surveys, and academic performance data. Paired t-tests, regression analysis were employed to analyze data. The study revealed that engaging in research led to improved scores in critical thinking assessments, particularly in terms of evaluation and synthesis skills. In addition, Kapinga (2020) researched on the role of institutional culture in barriers to research-based learning for cognitive development in Tanzania. The study established that RBL also contributes to the development of soft skills such as teamwork and communication skills. These skills are crucial for professional success in an increasingly collaborative work environment. However, without adequate support for RBL initiatives, many students miss out on these developmental opportunities. While the study identified several challenges affecting research, it did not delve into the possible ways to improve Research-Based Learning.

2.2.2 Possible ways to improve Research-Based Learning for the development of critical thinking among students in higher education institutions

Johnson & Brooks (2023) researched on teachers' involvement in resource management and its impact on educational quality in Belgium. Experimental design with mixed methods approach was adopted. The study administered questionnaires to 150 students and interviews to 20 faculty members from a large university. Paired t-tests and thematic analysis were employed for data analysis. The findings indicate that implementing regular faculty training on RBL methods in Faculty development for RBL and critical thinking led to significant improvements in students' critical thinking. Faculty participants who received professional development in RBL saw their students demonstrate enhanced analytical and problem-solving skills. However, the study was limited by its focus on a single institution, which might not be representative of all universities.

A study by Lugendo (2022) on the contribution of research-based learning to the development of critical thinking found that Research-Based Learning (RBL) enhances students' abilities to analyze information critically and make informed decisions. The study was purely qualitative and adopted a case study research design with 100 students (undergraduate level) as the respondents. Research instruments included semi-structured interviews and student surveys. Further, the study revealed that research-based learning enhanced students' problem-

solving skills, promoted deeper understanding, and fostered reflective thinking. However, students struggled with the application of critical thinking in non-structured tasks.

Similar trends have been observed regarding the importance of RBL in developing critical thinking skills. For instance, a study by the World Bank (2022) emphasizes that educational systems worldwide should adapt to include more research-oriented approaches to prepare students for complex real-world challenges. This global perspective reinforces the need for local institutions in Arusha to adopt best practices from successful models elsewhere. Despite these insights into the importance of RBL and its barriers, there remains a gap in addressing the unique context in Arusha Region. More localized research is needed to better understand how barriers influence students' engagement with RBL and how Institutions can tailor their approaches accordingly.

3. Methodology

The study employed a Sequential Explanatory Design to investigate how RBL is implemented in higher education institutions and its influence on the development of students' critical thinking skills within Arusha Region. As noted by Creswell & Clark, (2022), a Sequential Explanatory Design involves collecting and analyzing quantitative data in the initial phase, followed by qualitative data in the second phase, allowing the researcher to build upon initial numeric findings with rich, contextual insights. This design was selected because it enables a deeper interpretation of complex educational phenomena that cannot be fully explained through numerical data alone.

The target population for this study consisted of key stakeholders involved in RBL within higher education institutions in the Arusha Region. The primary group comprised 1,000 undergraduate students enrolled in various academic programmes across five selected institutions. These students were considered central to the study as they were directly engaged in learning processes, potentially shaped by research-based methodologies. In addition to undergraduate students, the study also included 600 master's degree students and 34 lecturers involved in supervising student research projects, as documented by the Tanzania Commission for Universities (TCU, 2024). Master's students were specifically selected due to the direct challenges they encountered during the research process, which positioned them as valuable informants regarding the practical difficulties of RBL. Lecturers, as key facilitators of research supervision and instruction, were also targeted for their perspectives on institutional and pedagogical challenges affecting the research process. The selection of master's programmes was based on their

availability and relevance across all universities in the region. Collectively, this target population was instrumental in providing reliable and context-specific insights into the barriers affecting the development of critical thinking through research engagement.

The sample size was calculated using Yamane's formula, which is expressed as;

$$n = \frac{N}{1 + N(e)^2}$$

Whereby n represents the required sample size, N denotes the total population size, and e refers to the margin of error, which in this case was set at 0.1 (Yamen et al., 2017). Based on the target population of 1,634 individuals and a 10% margin of error, the formula was applied as follows:

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{1634}{1 + 1634(0.1)^2}$$

$$n = 94.23,$$

Accordingly, the required sample size was approximately 94 respondents. This included 50 undergraduate students, 30 postgraduate students, and 14 lecturers drawn from the selected higher education institutions within the Arusha Region.

Stratified and simple random sampling methods were used to select 50 undergraduate and 28 postgraduate students from three higher learning institutions. Stratification was based on academic level such as undergraduate and postgraduate, while simple random sampling ensured that each student within these strata had an equal chance of selection. This approach aligns with the guidance by Johnson and Christensen (2021), who argue that stratified sampling enhances representativeness when the population contains distinct subgroups. Consequently, 25 female and 25 male undergraduate students were selected.

In addition, purposive sampling was used to select 14 lecturers from the HLIs. These lecturers were chosen based on their direct involvement in supervising students' research or teaching research methodology courses. According to Flick (2023), purposive sampling allows researchers to intentionally select individuals with specific expertise and knowledge relevant to the research topic. This combination of sampling methods enabled the researcher to gather diverse perspectives from both students and academic staff. The approach was effective in capturing variations in experiences and opinions regarding the implementation, barriers, and enhancement strategies of Research-Based Learning in higher education institutions within the Arusha Region. Three primary research instruments were used to collect data: questionnaires, interview guides, and document analysis protocols.

To ensure validity, all research instruments were subjected to expert review. Suggestions from these experts were incorporated to improve the instruments' face and content validity. Credibility was maintained throughout the data collection process, while trustworthiness was ensured by conducting repeated trials and consistency checks during instrument development.

The questionnaires were tested for reliability after a pilot study with respondents who did not participate in the actual study. The instrument was administered to the pilot group by the researcher. Based on the procedure described by Chetty and Jain (2020), the data obtained were tested for internal consistency of the items in the SPSS version 23. Reliability test was done through Cronbach's Alpha and then was correlated to obtain reliability coefficient $r = 0.767$, indicating a high level of internal consistency. According to O'Connor and Darlington (2022), Cronbach's Alpha values above 0.70 are indicative of acceptable reliability in educational and social science research, especially when assessing latent constructs involving attitudes, practices, and perceptions.

Quantitative data collected through structured questionnaires were systematically analyzed using descriptive statistical methods with the assistance of Statistical Package for Social Sciences (SPSS) Version 23. The findings were presented in tables. Qualitative data obtained from semi-structured interviews with lecturers were subjected to thematic analysis. This approach enabled the researcher to systematically identify, analyze, and report recurrent themes and subthemes that emerged from the narratives, offering in-depth insights into the lived experiences and perspectives of participants regarding RBL. Thematic analysis was useful in illuminating the contextual and institutional dynamics surrounding Research-Based Learning (RBL), as recommended by Braun and Clarke (2021), who emphasized its strength in unpacking complex social phenomena. Respondents were

assured that participation was voluntary. To safeguard anonymity and privacy, no names were required on questionnaires, and during interviews, respondents were identified using codes rather than personal identifiers. Data confidentiality was ensured by securely storing all collected information and limiting access to authorized personnel only. To uphold academic integrity, all scholarly sources used in the study were properly acknowledged to avoid plagiarism. The researcher also ensured transparency and honesty in reporting the findings.

4. Results and Discussion

The findings are discussed in accordance with the themes generated from the research questions that the study sought to answer.

4.1 Effects of Barriers on the Development of critical Thinking Skills among Students in Higher Education Institutions

The first objective of the study examined the effects of barriers to RBL on the development of critical thinking skills among students in HLIs within Arusha Region. A total of 10 items were drawn, and respondents were asked to express the extent to which the identified barriers affect students' ability to engage in critical inquiry, analytical reasoning, and problem-solving. A five-point Likert scale was adopted with the values: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. Table 1 provides a summary of responses from undergraduate and postgraduate students, highlighting the extent to which these barriers impact the development of critical thinking competencies essential for academic and real-world problem-solving.

Table 1 Responses on the Effects of Barriers on the Development of Critical Thinking Skills (n=78)

Statement	SA		A		N		DA		SD		Mean
	f	%	f	%	f	%	f	%	f	%	
Negatively affect seeking for research knowledge and skills	32	41.0	26	33.3	11	14.1	5	6.4	4	5.1	3.98
Affects the development of a sense of commitment among researchers	30	38.5	28	35.9	10	12.8	6	7.7	4	5.1	3.94
Negatively affects creativity and problem solving skills	34	43.6	24	30.8	9	11.5	6	7.7	5	6.4	3.97
Affects proper time management between the supervisee and supervisor	29	37.2	26	33.3	12	15.4	7	9.0	4	5.1	3.88
Results in inadequate research information for critical thinking skills.	28	35.9	27	34.6	13	16.7	6	7.7	4	5.1	3.88
May not enhance cordial relationship between researchers and supervisor	31	39.7	25	32.1	11	14.1	7	9.0	4	5.1	3.92
Leads to inadequate knowledge in topic selection	30	38.5	26	33.3	12	15.4	6	7.7	4	5.1	3.92
Provision of inadequate computer training courses to postgraduate students	27	34.6	28	35.9	13	16.7	6	7.7	4	5.1	3.87
Leads to irresponsible or inadequate use of internet services in universities	32	41.0	25	32.1	10	12.8	6	7.7	5	6.4	3.94
Affects commitment of supervisors	31	39.7	26	33.3	10	12.8	6	7.7	5	6.4	3.93
Grand mean score											3.92

Source: Field data (2025)

The data presented in Table 1 show that seeking research knowledge and skills is strongly affected by barriers to RBL, with 41.0% of respondents strongly agreeing and 33.3% agreeing. A further 14.1% were neutral, while 6.4% disagreed and 5.1% strongly disagreed, resulting in a high mean score of 3.98. This suggests that barriers to RBL hinder students' ability to acquire essential research competencies critical for analytical reasoning. These findings resonate with Green and Miller (2023), who reported that institutional obstacles significantly limit students' capacity to develop critical thinking through research engagement.

Similarly, the development of a sense of commitment among researchers is also negatively affected as 38.5% strongly agreed and 35.9% agreed, with 12.8% neutral responses. Meanwhile, 7.7% disagreed and 5.1% strongly disagreed, yielding a mean of 3.94. This indicates that barriers reduce motivation and responsibility thereby impeding students' dedication to research tasks. Lugendo (2022) also found that commitment is a crucial factor in enhancing problem-solving and reflective thinking through research, though lack of support may undermine this.

The data shows that poor RBL negatively affects creativity and problem-solving skills as strongly acknowledged by

43.6% strongly agreeing and 30.8% agreeing, while 11.5% were neutral, 7.7% disagreed, and 6.4% strongly disagreed. The mean score of 3.97 reflects the critical role of funding in facilitating research activities that stimulate analytical skills. This finding shows a strong consensus that limitations in fostering critical thinking directly impede students' creativity and problem-solving abilities. These skills are interlinked that is, critical thinking supports the evaluation of options, formulation of ideas, and finding innovative solutions. A high mean score of 3.97 confirms the strength of this perception. This aligns with the open-ended responses highlighting financial limitations as barriers to meaningful inquiry.

Barriers to RBL also affects proper time management between supervisees and supervisors. This was pointed out by 37.2% who strongly agreed and 33.3% agreed that barriers affect this coordination, alongside 15.4% who were neutral, 9.0% disagreeing, and 5.1% strongly disagreeing, producing a mean of 3.88. Effective supervisory relationships and time management are crucial in research-based learning. A large majority believes that barriers such as workload, communication gaps, or lack of structured guidance interfere with time coordination, which can delay research progress and hamper critical thinking development due to inconsistent feedback and support. This finding is supported by Komba's (2021) who observed that supervision quality and time allocation directly influence students' ability to engage in critical analysis and synthesis during research projects.

Data in table 1 shows that the barriers result in inadequate research information for critical thinking skills, with 35.9% strongly agreeing and 34.6% agreeing, 16.7% neutral, and a total of 12.8% disagreeing or strongly disagreeing, giving a mean of 3.88. Access to reliable and sufficient research information and resources (databases, libraries, journals) is fundamental for students to develop analytical and evaluative thinking skills. Limited access restricts the depth of inquiry and the ability to critique or synthesize information — all vital aspects of critical thinking. Lack of access to adequate information curtails students' capacity to critically evaluate and integrate knowledge, a notion supported by Kapinga (2020), who emphasized institutional culture's role in enabling or constraining research skill development.

The barriers may not enhance cordial relationship between researchers and supervisors was also highlighted with 39.7% strongly agreeing and 32.1% agreeing, 14.1% were neutral, and 14.1% disagreeing to some degree, resulting in a mean of 3.92. An unsupportive or strained supervisor-student relationship can inhibit open intellectual discourse, reduce feedback quality, and hinder confidence, all of which negatively impact critical reflection and independent

thought development, key to research-based learning. This factor is essential for effective mentorship and critical thinking development, corroborating Lugendo's (2022) findings regarding the importance of supportive research environments.

Additionally, the barriers were found to result in inadequate knowledge in topic selection or insufficient knowledge in carrying out research as reported by 38.5% who strongly agreed and 33.3% agreeing, while 15.4% were neutral and 12.8% disagreed or strongly disagreed. Choosing a research topic requires critical engagement with existing literature, awareness of gaps, and understanding methodological feasibility. Barriers that limit exposure to these processes weaken students' ability to formulate relevant and researchable questions, curbing critical thinking at the foundational stage of the research. The mean of 3.92 underscores the importance of early research skill acquisition, echoing Komba (2021) who noted the significant impact of topic selection proficiency on critical thinking outcomes.

Provision of inadequate computer training courses to postgraduate students was also mentioned, with 34.6% strongly agreeing and 35.9% agreeing, 16.7% were neutral, and 12.8% disagreeing or strongly disagreeing, resulting in a mean of 3.87. Digital literacy including research software, data analysis tools, and academic databases is integral to modern research. Inadequate training means students may not efficiently collect, analyze, or interpret data, which compromises both technical competence and critical evaluation skills. This points to the role of digital literacy in facilitating critical thinking in research contexts, consistent with literature emphasizing technology's role in modern scholarship.

It leads to irresponsible or inadequate use of internet services in universities was also pointed out, with 41.0% strongly agreeing and 32.1% agreeing, 12.8% were neutral, and 14.1% disagreeing or strongly disagreeing, yielding a mean of 3.94. Barriers may involve poor digital policies, limited access, or misuse of internet resources. When internet usage is unregulated or underutilized, students miss opportunities for wider exploration and critical engagement with diverse sources, affecting their research depth and analytical development. This finding aligns with a study by Green and Miller (2023) that identified poor internet access as a significant barrier to independent thinking and creativity in research.

During the interview process, most lecturers consistently affirmed that Research-Based Learning (RBL) plays a pivotal role in cultivating students' analytical reasoning, independent decision-making, and problem-solving capabilities.

One participant affirmed;

Well, Students who go through well-guided research processes are more reflective and less likely to accept things at face value. Again, through Research- based learning, students learn how to approach real-life problems methodically and propose feasible solutions, which is a sign of critical engagement (Interview with LR 6 on 26th May, 2025).

Another respondent added;

When students conduct their own research and defend their findings, they develop a strong sense of ownership and intellectual identity. Critical thinking emerges when students are tasked with selecting topics, formulating questions, reviewing literature, and interpreting data these activities which nurture their independent thought (Interview with LR 10 on 28th May, 2025).

These insights from lecturers are in strong alignment with the quantitative findings, which demonstrated that students who actively participate in research-related activities exhibit enhanced critical thinking skills. The agreement between qualitative and quantitative data reinforces the conclusion that RBL is a transformative pedagogical strategy that equips students with the capacity for independent inquiry, intellectual autonomy, and evidence-based reasoning.

These insights were further validated by findings from document analysis, which revealed that institutional policies and curriculum documents from various higher learning institutions in Arusha Region emphasize the role of student-led research in developing 21st-century skills such as critical thinking, creativity, and communication. However, the degree to which these goals are operationalized varies significantly across institutions. While some universities have embedded RBL components into coursework, others lack clear assessment strategies and structured pathways for research engagement, particularly at the undergraduate level. Institutional frameworks reviewed in course syllabi and quality assurance reports highlighted that students exposed to continuous research activities from proposal development to final defense demonstrate greater intellectual rigor and cognitive independence.

Moreover, internal institutional evaluation reports and research office records reviewed during document analysis indicated that students who engage in research projects or interdisciplinary inquiry-based tasks tend to outperform their peers in reflective assignments and problem-solving

assessments. These documents also emphasized the value of early exposure to research, collaborative approach, and mentorship in strengthening students' ability to critique sources, synthesize information, and defend arguments with empirical evidence. The convergence of qualitative, quantitative, and documentary evidence reinforces the conclusion that Research-based learning (RBL) is a transformative pedagogical strategy. It equips learners not only with practical research skills but also with the intellectual tools required for independent inquiry, evaluative reasoning, and lifelong learning. As such, the implementation of well-structured RBL programme is imperative for nurturing critically minded, research-oriented graduates capable of contributing meaningfully to knowledge production and real-world problem-solving.

Furthermore, the document analysis revealed that while postgraduate research is often supported by designated research coordinators, access to supervision for undergraduates is frequently limited due to high student-to-staff ratios and inadequate mentorship frameworks. Curriculum guides from three institutions indicated that although research was included as a final-year course, there was no continuous scaffolding of research skills from earlier semesters. Additionally, syllabi lacked integrated training on data management tools, referencing software, and ethical research protocols, which are crucial to foster independent inquiry and critical thinking.

The convergence of these qualitative insights with quantitative findings from questionnaire responses reveals a significant systemic gap in preparing undergraduate students for meaningful research engagement. While postgraduate students benefit from a structured process and academic mentorship, undergraduates are often underprepared and unsupported. This discrepancy limits the ability of early-career learners to fully benefit from Research-Based Learning (RBL) as a tool for critical thinking and intellectual development.

Finally, the barriers that highly affect the commitment of supervisors were recognized as influential, with 39.7% strongly agreeing and 33.3% agreeing, 12.8% were neutral, and 14.1% disagreement, giving a mean score of 3.93. Supervisor commitment is essential for mentorship, continuous feedback, and intellectual stimulation. Lack of engagement from supervisors can demotivate students, reduce learning opportunities, and ultimately stifle the critical inquiry process. This reflects the crucial role of supervisory engagement in nurturing students' decision-making and problem-solving skills during research, as supported by Lugendo (2022).

4.2 Possible ways to improve Research-Based Learning for the Development of Critical Thinking among Students in Higher Learning Institutions

The second objective of this study aimed to explore possible ways to improve Research-Based Learning (RBL) to enhance the development of critical thinking skills among students in higher education institutions.

Respondents were requested to indicate their level of agreement on various proposed strategies aimed at strengthening RBL practices. A five-point Likert scale was used, coded as follows: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. Table 2 presents a summary of responses from 78 participants including undergraduate and postgraduate students, reflecting the perceived effectiveness of the suggested approaches in promoting research engagement and critical thinking development.

Table 2: Responses from students on Strategies for improving Research-based learning in HLIs (n = 78)

Statement	SA		A		N		DA		SD		Mean
	f	%	f	%	f	%	f	%	f	%	
Early integration of research in curriculum to expand theoretical and practical knowledge	35	44.9	28	35.9	9	11.5	4	5.1	2	2.6	4.15
Increased mentorship to develop innovative thinking, creativity and professional skills	36	46.2	27	34.6	8	10.3	5	6.4	2	2.6	4.15
Improve digital infrastructure	32	41.0	29	37.2	10	12.8	5	6.4	2	2.6	4.08
Offers strategies and guidelines for finding solutions	34	43.6	26	33.3	11	14.1	5	6.4	2	2.6	4.09
Improve funding for student-led research to discovers solutions for social problems	31	39.7	27	34.6	12	15.4	6	7.7	2	2.6	4.01
Promotion of innovation-driven teaching	35	44.9	28	35.9	9	11.5	4	5.1	2	2.6	4.15
Gather evidence for theories and contribute to developing knowledge in a field of study	33	42.3	29	37.2	9	11.5	5	6.4	2	2.6	4.10
Allows to disprove lies and support truth	32	41.0	27	34.6	11	14.1	6	7.7	2	2.6	4.04
Ensuring adequate internet services in universities	32	41.0	25	32.1	10	12.8	6	7.7	5	6.4	3.94
High commitment of supervisors	31	39.7	26	33.3	10	12.8	6	7.7	5	6.4	3.93
Grand mean score											4.09

Source: Field data (2025)

A review of the results in Table 2 reveals key strategies suggested by respondents as potential ways to enhance Research-Based Learning (RBL) and, consequently, foster the development of critical thinking skills among students

in HLIs. To begin with, the item on early integration of research in curriculum to expand theoretical and practical knowledge as a strategy was supported by 35 respondents accounting for 44.9% who strongly agreed and 28 of participants accounting for 35.9% who agreed. Meanwhile, 11.5% remained neutral, 5.1% disagreed, and 2.6%

strongly disagreed. This resulted in a high mean score of 4.15, indicating a strong consensus that broadening knowledge domains is critical to effective RBL. These findings echo Johnson & Brooks (2023), who emphasized that faculty training programmes significantly enhanced students' analytical capacities when theory was connected to practice.

Similarly, the need to increase mentorship to develop innovative thinking, creativity and professional skills was affirmed by 46.2% of respondents who strongly agreed and 34.6% who agreed. About 10.3% were neutral, 6.4% disagreed, and 2.6% strongly disagreed. This produced a mean of 4.15 which was above the Grand mean score of 4.09, suggesting that fostering creativity is central to RBL's success. This finding aligns with the World Bank (2022) report, which advocates for education systems to nurture innovation to prepare students for complex global challenges.

Data in table 2 shows that developing digital infrastructure as a possible strategy to improve RBL received approval rating of 41.0% who strongly agreed and 37.2% agreed. In contrast, 12.8% were neutral, while 6.4% disagreed and 2.6% strongly disagreed. The resulting mean was 4.08, suggesting that social interaction is perceived as a beneficial element of RBL. This finding is in agreement to that of Johnson & Brooks (2023), who noted that interpersonal engagement strengthens collaborative learning and critical thinking.

The provision of strategies and guidelines for problem-solving to find solution was another possible way for improving RBL, with 43.6% strongly agreeing and 33.3% agreeing. A smaller portion of respondents, 14.1%, remained neutral, while 6.4% disagreed and 2.6% strongly disagreed. This gave a high mean of 4.09, indicating that structured guidance is crucial for nurturing critical thought.

Improve funding for student-led research to discover solutions for social problems as a measure to RBL received support from 39.7% of respondents who strongly agreed and 34.6% who agreed, while 15.4% were neutral, 7.7% disagreed, and 2.6% strongly disagreed. The mean score of 4.01 reflects a general agreement that RBL can address real-world issues. This assertion is echoed in the World Bank (2022) study which emphasized real-world problem-solving as a pillar of effective education.

Moreover, promotion of innovation-driven teaching as a measure to RBL for the generation of new knowledge was endorsed by 44.9% strongly agreeing and 35.9% agreeing, with 11.5% being neutral, 5.1% disagreeing, while 2.6% strongly disagreeing. The mean score recorded was 4.15, highlighting the role of innovation-driven teaching in

knowledge production in RBL. The finding was supported by O'Connor and Darlington (2023), who found that students exposed to well-structured research projects contributed original insights in their fields.

On the item concerning gathering evidence for theories and contribution to developing knowledge in a field of study, 42.3% strongly agreed and 37.2% agreed. A total of 11.5% were neutral, 6.4% disagreed, and 2.6% strongly disagreed, producing a mean of 4.10. This finding aligns with the idea that RBL not only enhances student learning but also contributes to disciplinary advancement. Additionally, the view that RBL helps disprove misinformation and supports truth was upheld by 41.0% who strongly agreed and 34.6% who agreed, while 14.1% were neutral, 7.7% disagreed, and 2.6% strongly disagreed. The mean score of 4.04 suggests that students perceive RBL as a critical mechanism for validating knowledge and improving reasoning.

The need to improve internet access in universities was also noted, with 41.0% strongly agreeing and 32.1% agreeing. Meanwhile, 12.8% remained neutral, 7.7% disagreed, and 6.4% strongly disagreed, leading to a mean of 3.94. Similarly, the importance of supervisor commitment was recognized by 39.7% strongly agreeing and 33.3% agreeing, followed by 12.8% neutral, 7.7% disagreeing, and 6.4% strongly disagreeing, yielding a mean of 3.93. These responses reflect participants' emphasis on strong institutional support structures also highlighted in the World Bank (2022) report and Johnson & Brooks (2023) as essential for RBL success.

During interview time, majority of lecturers from various Higher Learning Institutions consistently emphasized the necessity of institutional, policy-driven interventions to advance the implementation of Research-Based Learning (RBL).

One respondent remarked;

There is an urgent need to shift away from rote learning by cultivating a research culture that values inquiry, creativity, and problem-solving. Embedding research practices in first years will help students internalize research not merely as an academic obligation but as a fundamental cognitive approach (Interview with LR 1 on, 23rd May, 2025).

Another respondent stressed:

To reinforce Research-based learning (RBL), institutions should increase funding for student-

driven research projects and establish mentorship programmes that run throughout the academic cycle. Moreover, training workshops on research methodologies and digital literacy are critical for equipping students with the practical skills essential for today's scholarly demands (Interview with LR 3 on, 23rdMay, 2025).

These views support the study's findings that institutional commitment through policy, funding, and mentorship plays a central role in embedding RBL effectively. Such strategies, if adopted, could significantly enhance students' engagement, research competence, and critical thinking development.

The alignment between interview responses and document analysis findings underscores the critical role of institutional commitment in embedding RBL. Policies that formally recognize research activities within teaching loads, provide structured mentorship frameworks, and allocate financial support for student-led initiatives can significantly enhance the adoption and effectiveness of RBL. Furthermore, integrating digital research tools, promoting interdepartmental collaboration, and monitoring the impact of RBL on student outcomes are essential steps towards creating a sustainable research culture.

Taken together, these findings highlight that the advancement of RBL requires a deliberate and strategic approach driven by institutional policy, adequate funding, and continuous professional development. When effectively implemented, such measures not only foster deeper student engagement and critical thinking but also contribute to building a vibrant academic community rooted in inquiry, innovation, and knowledge creation.

5. Conclusion and Recommendations

5.1 Conclusion

The findings related to the first objective of this study demonstrate that the presence of institutional and pedagogical barriers critically undermines the development of students' critical thinking competencies in HLIs across the Arusha Region. Specifically, the study established that lack of robust research support systems, inconsistent supervisory practices, limited access to scholarly and digital resources, and inadequate training in foundational research skills substantially erode students' capacity for analytical reasoning, independent problem-solving, and reflective inquiry. Additionally, the study found that students who lacked early exposure to RBL were less likely to develop the intellectual autonomy necessary for academic inquiry and innovation. It weakens

students' preparedness to navigate complex real-world market and its challenges. The study also emphasizes that weak digital literacy among students compounds these challenges by limiting their capacity to access, evaluate, and synthesize academic information independently. In view of these findings, the study concludes that comprehensive institutional reforms should focus on strengthening mentorship systems, enhancing digital infrastructure, and embedding critical thinking pedagogy throughout the curriculum. Introducing research training from early undergraduate levels, offering digital skills workshops, and establishing monitoring systems for research supervision are also essential. Addressing these structural and pedagogical gaps is fundamental to fostering an academic environment where critical thinking is nurtured, and students are empowered to become independent, reflective, and socially responsible knowledge producers.

The findings related to the second objective underscore a variety of transformative strategies necessary to strengthen RBL and cultivate critical thinking among students in HLIs across Arusha Region. Key interventions identified include the need to expand both theoretical and practical research engagement, foster creativity, introduce structured problem-solving models, and enhance students' interpersonal, cognitive, and digital literacy skills. These dimensions are crucial in supporting learners to become reflective and independent thinkers equipped to analyze, synthesize, and apply knowledge to solve complex societal problems. A significant contribution of this objective lies in its emphasis on early integration of RBL practices into undergraduate curriculum. The present study reinforces that early and continuous exposure to research nurtures analytical reasoning and self-directed learning, two critical pillars of critical thinking development.

Moreover, institutional transformation was recognized as central to advancing RBL. Reforms such as increasing funding for student-led projects, enhancing internet infrastructure, rewarding innovative teaching approaches, and providing continuous capacity-building for supervisors were strongly endorsed by both participants and documentary evidence. The study further found that empowering lecturers through targeted professional development initiatives particularly in research mentorship, digital pedagogy, and student-centered supervision can significantly improve RBL outcomes. The study concludes that HLIs should build an academic ecosystem that champions inquiry, invests in infrastructure, supports mentorship, and empowers students with 21st century skills indispensable for producing graduates who are critical, creative, and capable of applying knowledge to address complex and evolving real-world challenges in the job market.

5.2 Recommendations

Based on the conclusion of the study, the researcher recommended the following:

1. Universities should incorporate research skills training into undergraduate programmes from the first year to promote a culture of inquiry and enable students to develop analytical, reflective, and problem-solving abilities early in their academic progression.
2. University lecturers and research supervisors should offer regular mentorship and constructive feedback throughout the research process to support students in identifying appropriate research topics, applying correct methodologies, and engaging in critical analysis.
3. Education oversight bodies such as the Tanzania Commission for Universities (TCU) should develop policies that institutionalize RBL and promote innovative teaching approaches to ensure that Research-based learning becomes a sustained and impactful component of academic programmes.

Reference

- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications.
- Chetty, P. and Jain, R. (2020). *How to Calculate the Sample Size of Primary Research?* India: Project Guru Publications.
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th.ed.). SAGE Publications.
- Creswell, J. W., & Plano Clark, V. L. (2022). *Designing and conducting mixed methods research* (4th.ed.). SAGE Publications.
- Creswell, J.W., & Plano Clark, V.L. (2020). *Designing and Conducting Mixed Methods Research* (3rd ed.). Sage Publications.
- Flick, U. (2023). *Introducing research methodology: A beginner's guide to doing a research project* (4th.ed.). SAGE Publications.
- Green, L. and Miller, K., (2023). Key Strategies for Building Research Capacity of University Faculty Members. *Innovation in Higher Education*,42(1):421–435.
- Johnson, B., & Christensen, L. (2021). *Educational research: Quantitative, qualitative, and mixed approaches* (7th.ed.). SAGE Publications.
- Johnson, E and Brooks, M. (2023). Gender equity and higher education transformation: A critical analysis of institutional responses in South Africa. *Gender and Education*, 32(2), 248–263.
- Johnson, R.B., & Onwuegbuzie, A.J. (2021). *Mixed methods research: A research paradigm whose time has come*. *Educational Researcher*, 33(7), 14-26.
- Kapinga, A. (2020). Barriers to Research-Based Learning in Higher Education Institutions in Tanzania: A Case Study of Arusha Region. *Journal of Education and Human Development*, 9(2), 45-58.
- Kibera, F., & Mshana, R. (2025). *Faculty Development and Its Role in Enhancing Research-Based Learning: A Case Study from Tanzania*. *African Journal of Higher Education Studies*, 8(1), 22-37.
- Komba, W. (2021). Access to Research Materials and Its Impact on Student Learning Outcomes in Tanzanian Universities. *International Journal of Educational Development*, 8(1) 102-110.
- Lugendo, M. (2022). Critical Thinking Skills Development in Higher Education: Challenges and Opportunities in Arusha Region. *African Journal of Educational Studies*, 15(1), 23- 34.
- Mwakapina, J. (2022). *Research-Based Learning and Critical Thinking: An Analysis of Higher Education Institutions in the Arusha Region*. *Tanzanian Journal of Higher Education Research*, 5(4), 88-99.
- Mwanga, J. (2020). The Role of Infrastructure in Enhancing Research-Based Learning in Tanzanian Universities. *East African Journal of Education and Social Sciences*, 1(3), 67- 75.
- O'Connor, M., & Darlington, L. (2022). Enhancing inquiry through institutional support: A framework for effective research-based learning. *International Journal of Educational Development*, 93(10)26-59.

Tanzania Commission for Universities. (2022). *Annual Report on Higher Education in Tanzania*. www.tcu.go.tz

World Bank. (2022). *Education Sector Review: Enhancing Critical Thinking Skills for Economic Development in Tanzania*. Retrieved from www.worldbank.org

Yamen, T., Sato, S and Maruyama, M (2017). *Sample Size Formula*. Atkins:
DOI:<https://doi.org/10.1016/j.opthta.2017>.