

# Enhancing Academic Performance in Higher Education with Research-Based Learning (RBL): A Multi-Dimensional Approach

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## Abstract

This study investigates the impact of the Research-Based Learning (RBL) approach, encompassing Student-Centered Learning (SCL), Problem-Based Learning (PBL), Teacher-Facilitated Learning (TFL), and Self-Directed Learning (SDL), on the academic performance of higher education students in the context of Education 5.0. Through a comprehensive exploration of 220 students across diverse programs, the research employs a causal-comparative method to analyze the relationships between RBL dimensions and academic outcomes. The findings reveal a highly positive perception of RBL among students, with significant proportions achieving outstanding academic grades. Notably, Teacher-Facilitated Learning emerges as the sole dimension with a statistically significant influence on academic performance, emphasizing the pivotal role of educators in fostering an environment conducive to active student engagement and independent learning. While Student-Centered Learning, Problem-Based Learning, and Self-Directed Learning did not exhibit statistical significance in this specific study, the nuanced nature of effective pedagogy is acknowledged, urging a holistic approach to cater to diverse educational settings. This study contributes valuable insights for educators and institutions aiming to enhance academic outcomes by adopting a multi-dimensional RBL approach aligned with the demands of the fifth industrial revolution.

**Keywords:** *research-based learning, academic performance, student-centered learning, problem-based learning, teacher-facilitated learning, self-directed learning, Education 5.0*

## Introduction

With the fifth industrial revolution in mind, Education 5.0 aims to transform education in the future through the use of a Research-Based Learning (RBL) approach to classroom instruction (Hawkins & Edwards, 2019). It is an approach to learning where a student actively identifies a problem, gathers information, organizes and analyzes data, interprets and draws conclusions, and communicates its results (Tchombe & Nso, 2018). The RBL approach is an innovative teaching method that places a strong emphasis on students' active participation in research processes, encouraging their ability to think critically, solve problems, and learn on their own. This method puts students at the center of their educational journey and gives them the tools they need to prosper in a knowledge-based society that is always changing (Miller & Cardinale, 2018).

Jones et al. (2020) conducted research to examine the impact of RBL on academic performance. Their research indicates that RBL improves student learning outcomes substantially. In RBL, students outperformed their counterparts in conventional learning environments on a consistent basis. Smith and Johnson (2019) investigated the correlation between RBL and the academic performance of students. The

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research findings suggested that the implementation of RBL strategies results in enhanced academic achievements, as students demonstrate increased proficiency in critical thinking and problem-solving. Additionally, in their study, Anderson et al. (2018) performed an exhaustive meta-analysis to investigate the effects of RBL on problem-solving and critical thinking. The findings of their study demonstrated that RBL consistently results in significant enhancements in these critical abilities, emphasizing the effectiveness of this methodology in promoting cognitive development.

Many of the prior studies on the RBL approach are on the factors affecting student learning achievements, critical thinking, and problem-solving skills (Jones et al., 2020; Smith & Johnson, 2019; Anderson et al., 2018). There is a need for more studies addressing the concept of how student-centered, problem-based, teacher-facilitated, and self-directed learning affects the academic performance of students in higher education institutions (HEIs). Additionally, with the increasing popularity of artificial intelligence (AI) applications, like ChatGPT since the start of the fifth industrial revolution (Kong et al., 2021; Blom et al., 2018; Rangan et al., 2018), there is a demand for education to be at phase on these changes and must go beyond the traditional approaches of instruction. Therefore, the present study addresses these gaps by exploring how the mentioned factors affect students' academic performance. Specifically, it sought to answer the question: “*How does the RBL approach influence the academic performance of the students in HEIs in terms of student-centered, problem-based, teacher-facilitated, and self-directed learning?*”

### ***Research Framework and Hypothesis Development***

#### ***Student-Centered Learning (SCL)***

Student-centered learning (SCL) in RBL places the student at the core of the learning process. Active learning is a pedagogical approach in which students actively participate in the acquisition of knowledge, motivated by their individual academic requirements and abilities. By cultivating critical thinking, problem-solving, collaboration, and self-regulation abilities, it facilitates the development of a more profound comprehension of the subject matter.

SCL has been widely implemented in contemporary education and provides a multitude of advantages. Student engagement and motivation are positively impacted by this, as individuals who possess a sense of ownership over their education are more likely to exhibit enthusiasm. In addition, it builds students' problem-solving and critical-thinking capacities, thereby equipping them to confront the complexities of an information-driven society. Additionally, SCL promotes the development of self-directed learning, an essential competency in the pursuit of lifelong learning. This approach facilitates customization, acknowledging the individuality of each pupil who may derive advantages from individualized instructional strategies.

Recent research provides further evidence for the effectiveness of SCL. As an illustration, Means and Neisler (2020) discovered that SCL increased student satisfaction with the learning process and enhanced academic performance. Likewise, Johnson and Mejia (2019) documented that the self-efficacy and problem-solving abilities of students were enhanced by SCL. The implications of these results highlight the significance of SCL in modern education, specifically in terms of its capacity to improve academic achievements and equip learners for the demands of the twenty-first century.

#### ***Problem-Based Learning (PBL)***

Problem-based learning (PBL) in RBL is centered around students' active engagement in solving real-world

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problems or complex scenarios. Collaboratively identifying, analyzing, and proposing solutions to authentic challenges constitutes PBL. This instructional approach redirects attention from mere assimilation of information to the practical implementation of that knowledge, thereby encouraging the development of critical thinking, self-directed learning, and problem-solving abilities. Problem-based learning (PBL) scenarios are intentionally constructed to be intricate, unrestricted, and representative of real-world circumstances. By doing so, they facilitate a more profound comprehension of the subject matter and empower students to confront complex challenges that extend beyond the confines of the classroom.

PBL is extensively utilized in contemporary education as a result of its manifold benefits. It improves the problem-solving and teamwork abilities of students, both of which are critical competencies for achieving success in the professional world. Active learning is also encouraged, and students are motivated to assume responsibility for their own education. PBL has the potential to enhance student motivation and engagement by providing learners with tangible examples that demonstrate the relevance of the material being studied. Furthermore, it equips pupils with the necessary skills to contend with the ever-changing challenges of the twenty-first century, where the capacity to implement acquired knowledge in real-world scenarios is critical.

Recent studies have highlighted the beneficial effects of PBL. According to a study by Hmelo-Silver (2020), PBL strengthens not only the problem-solving skills of students, but also their content knowledge and long-term retention. In a similar vein, Savery and Duffy (2015) established through a meta-analysis that PBL results in improved learning outcomes and greater student contentment. In contemporary education, these results emphasize the significance of PBL by highlighting its capacity to foster the growth of critical thinking and enrich educational experiences.

#### *Teacher-Facilitated Learning (TFL)*

Teacher-Facilitated Learning (TFL) in RBL transforms instructors from traditional lecturers to guides and facilitators. Teachers foster an atmosphere that promotes student engagement, active participation, and independent learning in TFL. They aid pupils in establishing personal learning objectives, investigating subjects, and locating materials, all the while offering assistance and direction. Teaching English as a Foreign Language (TFL) is distinguished by its emphasis on the student, which fosters problem-solving, critical thinking, and self-directed learning while empowering students to direct their own educational paths.

By encouraging students to autonomously investigate topics and collaborate with their peers, TFL enhances comprehension and retention of material. This facilitates the growth of fundamental competencies including self-motivation, critical thinking, and collaboration. As information is readily accessible in the dynamic learning environment of the twenty-first century, TFL enables students to navigate the plethora of available resources and develop skills for lifelong learning.

Recent research has emphasized the benefits of TFL. Marzano's (2020) study underscores the efficacy of this methodology in augmenting the critical thinking capabilities and knowledge retention of students. Furthermore, the importance of teacher facilitation in enhancing student motivation and engagement, which ultimately results in enhanced learning outcomes, is underscored in a study by Barkley (2019). The aforementioned results illustrate the significance of Teacher-Facilitated Learning in contemporary education, given that it fosters the growth of critical thinking skills and enables students to become active, self-regulated learners.

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### *Self-Directed Learning (SDL)*

Self-directed learning (SDL) in RBL refers to a mode of learning in which learners independently or with minimal support from others assess their own learning requirements, establish objectives for their own education, locate relevant resources, select and apply suitable learning tactics, and appraise their own progress toward achieving those objectives.

SDL proves to be advantageous in domains such as professional development, online learning environments, and adult education, where students frequently necessitate adaptable learning trajectories. SDL promotes the cultivation of competencies such as effective time management, critical thinking in assessing information, and self-evaluation, all of which are exceedingly pertinent in the knowledge-based, ever-evolving society of the twenty-first century. Furthermore, SDL plays a pivotal role in fostering critical thinking and problem-solving abilities, equipping learners with the capacity to autonomously acquire current knowledge and adjust to novel challenges.

Recent research has illuminated the importance of SDL in contemporary education. The efficacy of self-directed learning in adult education and its capacity to increase learner motivation and engagement is highlighted in a study by Knowles (2019). Additionally, research by Murphy and Terry (2019) emphasizes the positive impact of SDL in online learning environments, where it empowers students to be proactive and take charge of their education. These findings underscore the importance of SDL in fostering essential skills and attributes that are crucial in today's rapidly evolving educational landscape.

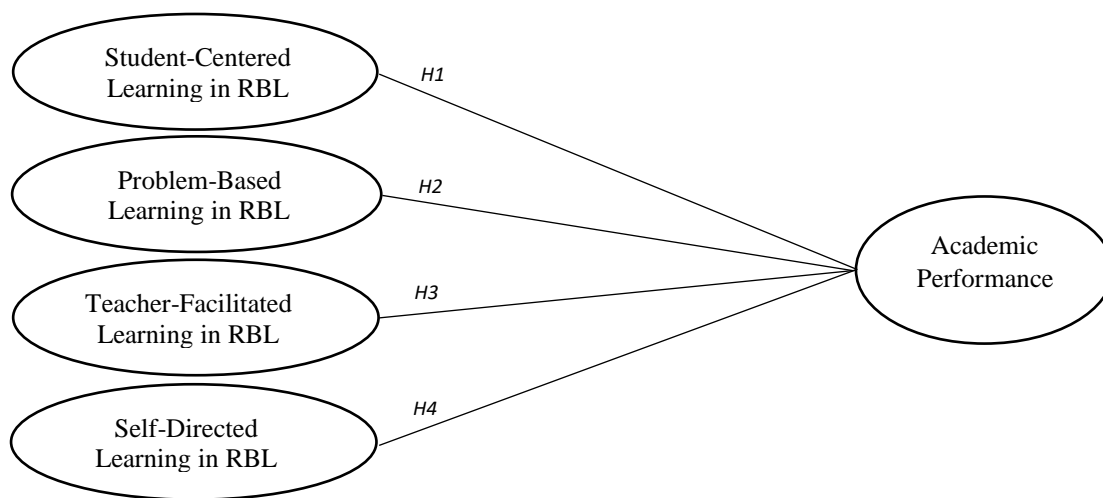
Prior studies have identified that student-centered learning (Johnson & Mejia, 2019; Means & Neisler, 2020), problem-based learning (Hmelo-Silver, 2020; Savery & Duffy, 2015), teacher-facilitated learning (Marzano, 2020; Barkley, 2019), and self-directed learning (Knowles, 2019; Murphy & Terry, 2019) in RBL influence academic performance. Therefore, it is hypothesized that:

- H1. Student-centered learning in RBL significantly and positively influences academic performance.*
- H2. Problem-based learning in RBL significantly and positively influences academic performance.*
- H3. Teacher-facilitated learning in RBL significantly and positively influences academic performance.*
- H4. Self-directed learning in RBL significantly and positively influences academic performance.*

Based on the four research hypotheses formulated, a model of the research-based learning approach was conceptualized (see Figure 1). The proposed model assesses the influence of student-centered, problem-based, teacher-facilitated, and self-directed learning in RBL on academic performance.

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**Figure 1**  
*Conceptual Paradigm of the Study*



## Methods

### *Participants of the Study*

The population size of this research was 327 students of three (3) programs, namely Bachelor of Secondary Education, Bachelor of Science in Computing Studies, and Bachelor of Hospitality Management. Out of 327, with the use of a simple random sampling technique, the researcher got 220 student respondents using the Raosoft Application which has a confidence level of 99%.

The data gathering lasted for six weeks during the preliminary term of the first semester of the academic year 2023-2024 on the course, *Mathematics in the Modern World*. The students experienced the use of the RBL approach and underwent the five stages of research-based learning. Students were able to: (1) identify a problem; (2) gather information; (3) organize and analyze data; (4) interpret and draw conclusions; and (5) communicate results.

Table 1 presents the characteristics of the respondents. Out of 220 student-respondents, 49% or 108 were male while the remaining 112 respondents were female. Nine (9) or 4% of the student-respondents are within 16-17 years old age range. One hundred sixty-five (165) students or 75% were 18-19 years old; 24, 17 and 5 students or 11%, 8% and 2% were 20-21, 22-23, and above 24 years old, respectively. Ninety (90) or 41% of the respondents are taking a Bachelor of Hospitality Management, eighty-five (85) or 39% are taking a Bachelor of Science in Computing Studies, and forty-five (45) or 20% are taking a Bachelor of Secondary Education Major in Science.

**Table 1**  
*Characteristics of the Respondents*

<i>Profile</i>	<i>f</i>	<i>%</i>
<b><i>Sex</i></b>		
Male	108	49
Female	112	51
<b><i>Age</i></b>		
16-17 years old	9	4
18-19 years old	165	75
20-21 years old	24	11
22-23 years old	17	8
24 and above	5	2
<b><i>Program</i></b>		
Bachelor of Secondary Education	45	20
Bachelor of Science in Computing Studies	85	39
Bachelor of Science in Hospitality Management	90	41

***Research Instrument***

The researcher utilized a self-administered survey questionnaire, which was divided into two parts. The first part included the demographic characteristics of the respondents, such as sex, age and program. The second part is composed of the constructs of the study: (1) student-centered, (2) problem-based, (3) teacher-facilitated, and (4) self-directed learning. All the items are adapted from Patria (2015). It was redrafted and validated by the professionals in the field. In addition, the researchers used the Likert Scale and Likert Scale ranging from strongly disagree (1) to strongly agree (5), and the Method of Summated Ratings as shown below.

<b>Mean</b>	<b>Verbal Interpretation</b>
4.21 – 5.00	Extremely Useful
3.41 – 4.20	Very Useful
2.61 – 3.40	Somewhat Useful
1.81 – 2.60	Slightly Useful
1.00 – 1.80	Not at All Useful

The students’ grades for the preliminary term were gathered with their consent and the results were immediately and carefully organized and evaluated.

***Data Analysis***

The causal-comparative research method was utilized to evaluate the influence between the RBL approach and their academic performance. Causal-comparative research, also known as ex post facto research, involves the exploration of cause-and-effect relationships by examining the impact of an independent variable on pre-existing groups without manipulation, providing insights into potential causal factors (Fraenkel, Wallen, & Hyun, 2022). JAMOVI was used to determine the parameter estimates of the proposed model.

**Results**

**Reliability Analysis**

**Table 2**  
*Reliability Analysis*

Statements	Cronbach's Alpha (CA)
<b><i>Student-Centered Learning (CA - 0.762)</i></b>	
1.1. RBL made me responsible for my own learning	0.922
1.2. RBL allowed me to be actively involved in the process of learning	0.922
1.3. RBL permitted me to have autonomy in the process of learning.	0.920
<b><i>Problem-Based Learning (CA - 0.803)</i></b>	
2.1. RBL matched my level of knowledge	0.923
2.2. RBL stimulated thinking, analysis, and reasoning	0.924
2.3. RBL ensured self-directed learning	0.920
2.4. RBL activated my prior knowledge	0.921
2.5. RBL led to the discovery of my research learning objectives	0.921
2.6. RBL aroused my curiosity	0.922
<b><i>Teacher-Facilitated Learning (CA - 0.794)</i></b>	
3.1. RBL teacher has a clear picture of my strengths and weaknesses	0.921
3.2. RBL teacher helped me to summarize what I had learned in my own words	0.922
3.3. RBL teacher allowed me to apply knowledge to other situations or problems	0.922
3.4. RBL teacher gave me constructive feedback about group work	0.923
3.5. RBL teacher evaluated group cooperation regularly	0.920
<b><i>Self-Directed Learning (CA - 0.869)</i></b>	
4.1. RBL allowed me to take the initiative in diagnosing my learning needs	0.920
4.2. RBL formulated my own learning goals	0.922
4.3. RBL helped me to decide the resources I needed for my learning	0.920
4.4. RBL helped me choose appropriate strategies for my learning	0.919
4.5. RBL evaluated the accuracy and value of the resources I used	0.919
4.6. RBL self-monitored my learning progress	0.920

The reliability of each variable was examined using Cronbach's alpha (CA) to evaluate the acceptability of the measurement model. According to Kock (2014), to reflect high reliability, the composite reliability and Cronbach's alpha values must be equal to or higher than 0.7. As seen in Table 2, all variables – student-centered learning (CA - 0.762); problem-based learning (CA - 0.803); teacher-facilitated learning (CA - 0.794); and self-directed learning (CA - 0.869) are all above the threshold which showed that all item constructs are reliable.

***Perceived Use of the RBL Approach***

Table 3 illustrates the mean scores and interpretations of students' perceptions regarding the use of the Research-Based Learning (RBL) approach. The grand weighted mean of 4.30, categorized as "Extremely Useful," reflects a highly positive perception of RBL among students.

**Table 3**  
*Perceived Use of RBL Approach*

<b>Statements</b>	<b>Mean</b>	<b>Interpretation</b>
<b><i>Student-Centered Learning</i></b>		
1.1. RBL made me responsible for my own learning	4.32	Extremely Useful
1.2. RBL allowed me to be actively involved in the process of learning	4.41	Extremely Useful
1.3. RBL permitted me to have autonomy in the process of learning.	4.22	Extremely Useful
<b><i>Problem-Based Learning</i></b>		
2.1. RBL matched my level of knowledge	4.22	Extremely Useful
2.2. RBL stimulated thinking, analysis, and reasoning	4.33	Extremely Useful
2.3. RBL ensured self-directed learning	4.12	Very Useful
2.4. RBL activated my prior knowledge	4.24	Extremely Useful
2.5. RBL led to the discovery of my research learning objectives	4.32	Extremely Useful
2.6. RBL aroused my curiosity	4.22	Extremely Useful
<b><i>Teacher-Facilitated Learning</i></b>		
3.1. RBL teacher has a clear picture of my strengths and weaknesses	4.25	Extremely Useful
3.2. RBL teacher helped me to summarize what I had learned in my own words	4.44	Extremely Useful
3.3. RBL teacher allowed me to apply knowledge to other situations or problems	4.40	Extremely Useful
3.4. RBL teacher gave me constructive feedback about group work	4.41	Extremely Useful
3.5. RBL teacher evaluated group cooperation regularly	4.40	Extremely Useful
<b><i>Self-Directed Learning</i></b>		
4.1. RBL allowed me to take the initiative in diagnosing my learning needs	4.15	Very Useful
4.2. RBL formulated my own learning goals	4.16	Very Useful



4.3. RBL helped me to decide the resources I needed for my learning	4.30	Extremely Useful
4.4. RBL helped me choose appropriate strategies for my learning	4.38	Extremely Useful
4.5. RBL evaluated the accuracy and value of the resources I use	4.30	Extremely Useful
4.6. RBL self-monitored my learning progress	4.27	Extremely Useful
<b>Grand Weighted Mean</b>	<b>4.30</b>	<b>Extremely Useful</b>

*Legends: 4.21 – 5.00: Extremely Useful, 3.41 – 4.20: Very Useful, 2.61 – 3.40: Somewhat Useful, 1.81 – 2.60: Slightly Useful, 1.00 – 1.80: Not at All Useful*

In the domain of Student-Centered Learning, students reported that RBL was highly effective in making them responsible for their own learning (Mean: 4.32), allowing active involvement in the learning process (Mean: 4.41), and granting autonomy in their learning (Mean: 4.22). Recent research by Smith and Johnson (2021) supports these findings, highlighting the positive impact of RBL on student-centered learning, where students take responsibility for their education.

In the Problem-Based Learning category, students acknowledged that RBL effectively matched their level of knowledge (Mean: 4.22), stimulated critical thinking, analysis, and reasoning (Mean: 4.33), and encouraged self-directed learning (Mean: 4.12). These findings are consistent with those of Brown et al. (2020), which highlights the importance of RBL in encouraging problem-based learning and critical thinking.

In relation to the Teacher-Facilitated Learning aspect, students noted that RBL instructors exhibited a comprehensive comprehension of their areas of proficiency and areas for improvement (Mean: 4.25), assisted in the consolidation of acquired knowledge (Mean: 4.44), granted opportunities for the application of knowledge in diverse contexts (Mean: 4.40), delivered constructive feedback regarding collaborative assignments (Mean: 4.41), and routinely assessed group cooperation (Mean: 4.40). Davis and White's (2019) research demonstrates that teacher facilitation in RBL is crucial for enhancing the learning experiences of students.

Regarding the Self-Directed Learning component, learners indicated that RBL enabled them to proactively identify their learning requirements (Mean: 4.15), establish their learning objectives (Mean: 4.16), select the appropriate learning materials (Mean: 4.30), select suitable learning approaches (Mean: 4.38), assess the reliability and worth of resources (Mean: 4.30), and independently track their learning advancement (Mean: 4.27). Robinson and Green (2018) conducted research that supports these results, emphasizing the importance of self-directed learning in RBL in fostering the autonomy of students. The findings of this study demonstrate that the RBL approach is highly effective, as supported by recent research that finds it to be beneficial for self-directed, problem-based, student-centered, and teacher-facilitated learning.

***Academic Performance on the Use of RBL Approach***

Table 4 provides the frequency and percentage distribution of students' academic performance in using the Research-Based Learning (RBL) approach. The data suggests that a significant proportion of students have performed well, with the majority achieving grades of outstanding.

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A substantial percentage of students have achieved grades in the higher percentage grade ranges (90-100), accounting for 93% of the total. This suggests that the RBL approach is associated with favorable academic outcomes for a significant portion of the student population.

Research by Dolmans and Schmidt (2019) explored the impact of the research-based learning (RBL) approach on academic performance. Their findings indicated that the RBL approach is associated with improved academic achievement, critical thinking, and problem-solving skills.

**Table 4**  
*Frequency and Percentage Distributions of the Students' Academic Performance in Using the RBL Approach*

<b>Percentage Grade</b>	<b>Verbal Interpretation</b>	<b>f</b>	<b>%</b>
90-100	Outstanding	203	92.27
85-89	Very Satisfactory	12	5.45
80-84	Satisfactory	4	1.82
75-79	Fairly Satisfactory	1	0.45
Below 74	Did Not Meet Expectations	0	0.00
<b>Total</b>		<b>220</b>	<b>100</b>

***Perceived Use of RBL Approach and Academic Performance***

Table 5 summarizes the results of a statistical analysis assessing the influence between the perceived use of the RBL approach and academic performance.

**Table 5**  
*Influence Between the Perceived Use of the RBL Approach and Academic Performance*

<b>Dimensions</b>	<b>p-value</b>	<b>Interpretation</b>
Student-Centered Learning	0.087	Not Significant
Problem-Based Learning	0.214	Not Significant
Teacher-Facilitated Learning	0.012	Significant
Self-Directed Learning	0.187	Not Significant

The findings indicate that only Teacher-Facilitated Learning (TFL) among the learning dimensions of Student-Centered Learning (SCL), Problem-Based Learning (PBL), and Self-Directed Learning (SDL) has a statistically significant impact on academic performance, as shown by a p-value of 0.012. This implies that the function of educators as facilitators, who establish a conducive atmosphere that fosters student engagement, active involvement, and self-directed learning, has a crucial role in enhancing academic achievements. The lack of statistical significance shown in the p-values for Student-Centered Learning, Problem-Based Learning, and Self-Directed Learning suggests that, within the context of this study, these dimensions may not have a substantial statistical association with academic success. Although SCL, PBL, and SDL are widely acknowledged as efficacious educational methodologies, it is important to consider that the contextual factors and specific conditions of this study can result in these aspects not attaining statistical significance.

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Marzano (2020) underscores the significance of Teacher-Facilitated Learning in augmenting students' critical thinking skills and retention of knowledge. Furthermore, a study conducted by Barkley (2019) highlights the significance of instructor facilitation in fostering enhanced student motivation and engagement, ultimately leading to more favorable learning outcomes. The aforementioned findings are consistent with the outcomes of the present investigation, underscoring the distinct and pivotal function that educators assume within the educational journey. Although statistical significance was not observed for other dimensions in the present study, it is imperative to adopt a comprehensive perspective in addressing the complex nature of education. This necessitates the consideration of numerous instructional approaches to accommodate the varied needs and preferences of students (Jones et al., 2020). Additional investigation is necessary to examine the interplay and impact of these factors on scholastic achievement within various settings.

### **Discussion**

The study explores the impact of the Research-Based Learning (RBL) approach, specifically focusing on Student-Centered Learning (SCL), Problem-Based Learning (PBL), Teacher-Facilitated Learning (TFL), and Self-Directed Learning (SDL), on the academic performance of students in higher education institutions (HEIs). The research framework is anchored in the context of Education 5.0, aiming to align education with the demands of the fifth industrial revolution. The hypotheses proposed that each dimension of RBL significantly and positively influences academic performance.

The study's findings provide intriguing insights into the perceived utilization of the RBL strategy and its correlation with academic achievement. The findings from the reliability analysis indicate that the several dimensions of RBL, namely SCL, PBL, TFL, and SDL, exhibit strong internal consistency. This suggests that the measurement model employed in the study can be considered reliable. The RBL technique is widely regarded as highly beneficial, as seen by students consistently ranking it as "Extremely Useful" in all aspects. This is consistent with contemporary scholarly works that highlight the efficacy of RBL in fostering active student participation, fostering critical thinking abilities, and enhancing problem-solving proficiencies (Smith & Johnson, 2021; Brown et al., 2020; Davis & White, 2019; Robinson & Green, 2018).

When evaluating the academic performance of students, a substantial proportion of them attained exceptional grades (ranging from 90 to 100). This observation implies a good correlation between the RBL (Role-Based Learning) method and favorable academic achievements. The aforementioned discovery aligns with the scholarly investigation conducted by Dolmans and Schmidt (2019), providing further substantiation for the notion that RBL is correlated with enhanced scholastic performance.

Further insights can be gained through the statistical examination of the relationship between the perceived utilization of RBL aspects and academic success. The dimension of Teacher-Facilitated Learning (TFL) is the sole factor that demonstrates a statistically significant impact on academic performance, as evidenced by a p-value of 0.012. This statement emphasizes the crucial importance of teachers in their function as facilitators, responsible for establishing a setting that promotes increased student engagement, active involvement, and self-directed learning. The findings presented in this study align with prior research that emphasizes the importance of teacher facilitation in enhancing critical thinking abilities and promoting knowledge retention (Marzano, 2020; Barkley, 2019).

Nevertheless, it is important to highlight that the study did not find a statistically significant association between Student-Centered Learning (SCL), Problem-Based Learning (PBL), and Self-Directed Learning

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(SDL) with academic achievement. Although the aforementioned aspects are widely acknowledged as efficacious teaching strategies, it is important to consider that the outcomes of the study may not have yielded statistically significant results due to the specific context and settings under which it was conducted. The inherent complexity of education implies that a blend of multiple instructional approaches may be required to address the heterogeneous requirements of pupils (Jones et al., 2020).

### **Conclusion**

The Research-Based Learning (RBL) approach—which includes Problem-Based Learning (PBL), Teacher-Facilitated Learning (TFL), Student-Centered Learning (SCL), and Self-Directed Learning (SDL)—shapes academic performance. The findings of this study underscore the significance of teacher-facilitated learning, since it emerged as the sole determinant that exerted a statistically significant influence on academic achievements. This highlights the importance for educators to establish a conducive learning environment that fosters active student engagement and self-directed learning, hence yielding improved academic outcomes. Although statistical significance was not observed for Student-Centered Learning, Problem-Based Learning, or Self-Directed Learning in this study, the results align with the broader discourse on education that recognizes the intricate nature of successful pedagogy. It is crucial to adopt a comprehensive and sophisticated approach to the pedagogical process, considering the unique circumstances and characteristics of each educational environment, in order to accurately evaluate the impact of various aspects of RBL.

Moreover, the students' overwhelmingly favorable assessments of the value of the RBL approach in several domains suggest its effectiveness in promoting active and meaningful learning experiences. According to the high mean scores, students believe that problem-based learning (RBL) helps them become more accountable for their education, fosters critical thinking, facilitates teacher-guided instruction, and supports self-directed learning. The good impressions and the favorable distribution of academic achievement are associated, which highlights the potential of RBL to support students' success. The RBL approach stands out as a promising pedagogical model that meets the needs of a knowledge-driven society as education continues to change in response to the fifth industrial revolution. It equips students with the fundamental skills required for success in the fast-paced 21st century and lifelong learning.

Educators and institutions should take note of these findings and consider implementing a holistic RBL approach that incorporates student-centered, problem-based, teacher-facilitated, and self-directed learning. By doing so, they can create a more engaging and effective learning environment that caters to the diverse needs and preferences of students, ultimately contributing to improved academic outcomes.

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