



RESEARCH PAPER

Inquiry-Based Teaching Practices and Learner Autonomy: Effects on Motivation and Self-Regulated Learning

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ABSTRACT

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This study examined the effects of inquiry-based teaching practices on learner autonomy, motivation, and self-regulated learning among undergraduate students in higher education institutions. Inquiry-based teaching encourages students to actively explore concepts, investigate problems, ask questions, and participate in knowledge construction, thereby promoting independent and reflective learning behaviors. In contemporary education, learner autonomy and self-regulated learning are considered essential competencies that support academic achievement, critical thinking, and lifelong learning. The study adopted a quantitative research design using a cross-sectional survey method. Data were collected from 250 undergraduate students enrolled in public and private universities of Karachi, Sindh, through structured questionnaires using a stratified random sampling technique. Descriptive statistics, Pearson correlation, and regression analysis were conducted through SPSS Version 26 to examine relationships among variables. The findings revealed that inquiry-based teaching practices significantly and positively influenced learner autonomy, motivation, and self-regulated learning. The study concluded that inquiry-oriented pedagogy enhances students' independent learning abilities, academic engagement, and reflective learning practices. The research contributes to student-centered pedagogy by emphasizing the importance of inquiry-based instructional practices in fostering autonomous, motivated, and self-regulated learners in higher education.

Introduction

Inquiry-based teaching has become one of the most relevant approaches to teaching in the current education system. This can be attributed to the importance placed on active learning, critical thinking, and the need for greater student participation. The most recent changes in education have transformed teaching from the older, traditional Teacher-Centered approaches to Student-Centered teaching systems where students are active participants in the construction of their knowledge through questioning, research and reflection (Pedaste et al., 2015; Lazonder & Harmsen, 2016). The need for learner autonomy in higher education has been

consolidated as, during their study, autonomous learners are better able to control their learning, are able to make choices, and participate in learning activities beyond the formal education system (Feri et al., 2016; Ryan & Deci, 2020). Motivation and the ability to self-regulate learning are important in determining the degree of achievement, engagement, and persistence exhibited by university students (Panadero, 2017; Greene et al., 2018). In the 21st Century, higher education institutions are expected to equip students with the ability to learn independently, and to think critically, and solve problems in order to cope with the advanced academic and professional demands.

Inquiry-Based Teaching in Higher Education

Inquiry-based teaching is a student-centered approach that promotes active problem-solving and question-driven investigation (Pedaste et al., 2015). Inquiry-based instruction focuses on the process of acquiring knowledge as opposed to the retention of facts. Active participation is critical to this process. Discussions, collaborations, and reflections, as well as reasoning based on evidence, are key components of this approach (Jeong et al., 2019; Lazonder & Harmsen, 2016). Inquiry-based teaching is also supported by the Constructivist Learning Theory, which posits that knowledge is created and developed based on an individual's interactions and experiences (Kay & Kibble, 2016). In response to this theory, many higher education institutions have implemented instructional strategies that center on inquiry, such as problem-based learning, group work, reflective tasks, and research activities.

Even with changes to student-centered learning, independent learning experiences, and learner autonomy, have become neglected in many customary learning environments. This often leads to students becoming demotivated, experiencing difficulty in the management of learning, and struggling, if not failing, to achieve the self-regulation necessary to complete their academic work (Panadero, 2017; Shi et al. 2020). For this reason, strengthening the importance of active learning, through inquiry, for greater learner autonomy, self-regulation, and motivation among the students in higher education, requires urgent study (Ünlü & Dökme, 2020; Lin et al., 2020).

Research Hypotheses

Literature Review

Concept of Inquiry-Based Teaching

Inquiry-based teaching is less about student information absorption and more about active exploration, questioning, investigation, and knowledge construction. Pedaste et al. (2015) describe inquiry-based learning as a systematic approach where students develop questions, study issues, analyze data, and report results. Critical thinking, collaboration, and reflection are at the center of this approach (Correia & Harrison, 2019; Constantinou et al., 2018). In earlier times, like during John Dewey's progressive educational philosophy, learning by doing and experiential learning were the focus. Today's inquiry-based teaching focuses on the construction of knowledge as the result of students' participation and interaction with peers and the environment (Acar & Tuncdogan, 2018). Teaching and learning practices characterized by this approach engage learners meaningfully and use problem-based activities, research tasks, and collaboration, along with reflection (Lazonder & Harmsen, 2016; Gómez & Suárez, 2020). Inquiry pedagogy's fundamental tenets are

learner participation, exploration, reasoning with evidence, independence, and engagement (Kuisma & Nokelainen, 2018; Vieira, 2020).

Learner Autonomy in Education

Learner autonomy is a concept that emphasizes the independent control of the learning process, which involves goal setting, strategy selection and self-assessment (Tomasouw & Marantika, 2020). Feri et al. (2016) elaborated on this and stated that learner autonomy is control and determination of the independent learning process. Self-direction, independent decision-making, responsibility and reflective learning are the inner characteristics of autonomy. In higher education, concern of learner autonomy is fundamental, since students are participating in independent investigation, critical analysis and are expected to continue learning throughout their life (Little, 2015, Vieira, 2020). Learner autonomy stimulates confidence in students, which is highly important for engagement in academic processes, in the organization of study methods, and in the implementation of problem-solving processes (Zarouk et al., 2020; Kuisma & Nokelainen, 2018). Learner autonomy increases academic flexibility and transforms students from passive knowledge receivers to active participants in the learning processes and knowledge seeking (Suárez et al., 2018; Correia & Harrison, 2019).

Motivation in Learning

Motivation determines the type of learning behavior exhibited by a student, their level of engagement in school, and even the achievement level at school. Ryan and Deci (2020) distinguished intrinsic motivation and the latter as engaging in learning for personal pleasure and interest, and for external rewards or pressure, respectively. The level of academic motivation has a fundamental influence on a student's persistence, level of participation in school activities, and performance (Schunk & DiBenedetto, 2020; Moote, 2020). An inquiry-based learning environment is instrumental in promoting classroom engagement and reflecting active participation in learning tasks (Archer-Kuhn & MacKinnon, 2020; Gómez & Suárez, 2020). Learning activities that stimulate inquiry encourage the development of a positive learning attitude, interest, and confidence by engaging students in a meaningful learning process (Lin et al., 2020; Kolovou & Kim, 2020).

Self-Regulated Learning

Self-regulated learning is defined by the control over cognitive, emotional, and behavioral learning processes. According to Panadero (2017), self-regulated learners are those who define learning goals, who are committed to the process of monitoring learning progress, and who select and adapt learning strategies as needed, and who evaluate learning outcomes. The crucial elements of self-regulated learning are planning, self-monitoring, self-evaluating, and reflexive thinking. When it comes to self-regulation, its relevance in the context of learning and education is its centrality to the successful completion of the learning process, or more specifically, learning at the post-secondary level, where the learner is expected to facilitate the learning process and engage in a myriad of learning activities (Zimmerman, Schunk, & DiBenedetto, 2017; Greene et al., 2018). Moreover, there appears to be a strong positive correlation between self-regulated learning and learner autonomy. More specifically, the dimension of self-regulated learning manifests in learners who are committed to monitoring their learning progress, using learning strategies, and concomitantly improving their learning outcomes (Zarouk et al., 2020; Vieira, 2020).

Inquiry-Based Learning and Motivation

Multiple studies indicate that there is a positive correlation between student motivation and learning through inquiry. When students participate in activities in the classroom, their desires in the subject matter and appreciation for the process of discovery are heightened (Lazonder & Harmsen, 2016). When students are in a learning environment that is inquiry oriented, they can think beyond the lessons and integrate the information into their world. This increases students' confidence in their academic abilities (Pedaste et al., 2015). When students are given the chance to learn through discovery on their own, they gain ownership of the classroom, which increases academic motivation. Therefore, it can be argued that the practice of inquiry within the classroom increases students' engagement and motivation considerably.

Inquiry-Based Learning and Self-Regulated Learning

Inquiry-based learning also helps in improving autonomous learning skills. Self-led inquiry tasks direct the learners to independently address issues, arrange the relevant information, scrutinize the data, and assess the appropriateness of the solutions. These enhance self-regulation and one's analytical skills (Panadero, 2017). During the inquiry learning process, learners are prompted to articulate learning objectives, assess their developments, and contemplate the results. Acar and Tuncdogan (2018) stated that learning by inquiry fosters the drive to learn independently by stimulating the learners to take full charge of their learning processes. In addition, self-regulation is also characterized by problem-solving capability, reflective thinking, and analysis, which are promoted by instruction based on inquiry.

Theoretical Framework

This study is based on three major educational theories. The first is Constructivist Learning Theory, which posits that learners gain knowledge by constructing it actively through interaction, experience, and reflection (Kay & Kibble, 2016). Inquiry-based teaching is rooted in constructivism, as students take part in the exploration and problem-solving stages. Self-Determination Theory (SDT) proposes that the psychological needs of autonomy, competence, and relatedness increase intrinsic motivation and engagement (Ryan & Deci, 2020). Learning environments that are oriented toward inquiry satisfy the psychological needs by allowing learners the option to choose, encouraging participation, and stimulating inquiry. Social Cognitive Theory supports this study by focusing on the role of self-efficacy, observational learning, and self-regulation within the educational context (Schunk & DiBenedetto, 2020).

Empirical Review of Previous Studies

Numerous studies have shown a correlation between inquiry-based learning and higher levels of motivation, participation, and engagement in learning activities. Pedaste et al. (2015) characterize inquiry learning within the framework of a critical and student-centered pedagogy. A meta-analysis by Lazonder and Harmsen (2016) confirmed that inquiry learning promotes engagement and learning at the conceptual level. The studies on autonomous learning suggest that the promotion of autonomous learning leads to students being more responsible and confident, as well as positively affecting their academic achievement (Feri et al., 2016). The studies on self-regulated learning indicate that teaching through an inquiry approach develops

the ability of students to set and evaluate their learning goals and improves their ability to reflect on their learning process (Panadero, 2017). It is astonishing that, in spite of the numerous studies on these topics, the interrelation of inquiry learning in combination with the learner autonomy, motivation, and self-regulated learning within the higher education context has yet to be studied. Thus, this study aims to fill this research gap and examine these interrelations in detail.

H1 Inquiry-based teaching practices have a significant positive effect on learner autonomy.

H2 Inquiry-based learning has a significant positive relationship with students' motivation.

H3 Inquiry-based learning significantly enhances self-regulated learning skills.

Conceptual Framework

This study's conceptual framework illustrates the connection between inquiry-based teaching practices and student learning outcomes (see Figure 1). Within the framework, the independent variable is the teaching practice, and dependent variables are learner autonomy, motivation, and self-regulated learning. The framework argues that, through active participation, independent inquiry, collaboration, critical engagement, and reflection, inquiry-based practices in teaching stimulate the development of autonomy, motivation, and self-regulated learning of students (Pedaste et al., 2015; Aditomo & Klieme, 2019). From the perspective of students, inquiry-based learning environments motivate them to be active participants in the process of knowledge construction, thereby enhancing independent learning, intrinsic motivation, and self-regulation (Gómez & Suárez, 2020; Zarouk et al., 2020).

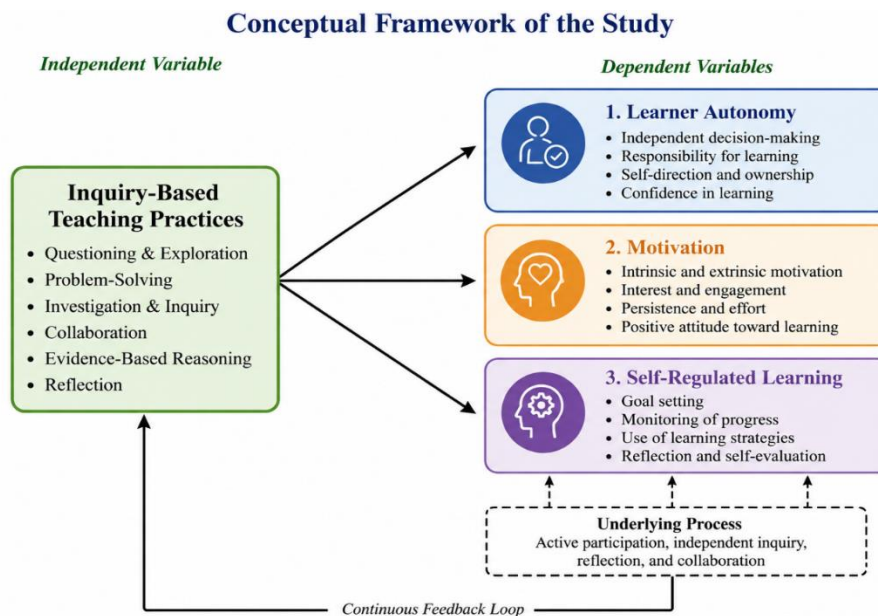


Figure 1. Conceptual Framework of Inquiry-Based Teaching Practices, Learner Autonomy, Motivation, and Self-Regulated Learning

Material and Methods

This research used a quantitative research methodology to investigate how undergraduate students' learner autonomy, motivation, and self-regulated learning are impacted by the use of inquiry-based teaching practices. A cross-sectional survey design was used allowing the researcher to collect data from participants one time and study relationships among variables (Creswell & Creswell, 2017). Quantitative research was chosen because it provides the opportunity for statistical analysis and the objective measuring of educational phenomena (Apuke, 2017).

Population of the Study

The sample for this research comprised undergraduate students attending both public and private institutions of higher education. Students from varying academic year levels and fields of study were sampled to capture a wide range of views on inquiry-based teaching practices and learning outcomes.

Sampling Technique and Sample Size

The study utilized a stratified random sampling technique to ensure representation across universities, disciplines, and semesters. The study's subject pool consisted of 250 respondents, all of whom are undergraduate students attending either the public or private universities of Karachi, Sindh. According to educational research conducted by Taherdoost (2017), the sample size selected completes a standard requirement for the performance of correlation and regression analysis.

Research Instrument

Data collection was conducted using a framework questionnaire grounded in the literature of inquiry-based learning, learner autonomy, motivation, and self-regulated learning. The questionnaire included five sections: demographic data, inquiry-based teaching practices, learner autonomy, motivation, and self-regulated learning. A five-point Likert scale was employed to gauge responses, ranging from strongly disagree to strongly agree.

Validity and Reliability

The instrument's content validity was established by education and research methodology specialists. A preliminary study was carried out involving 20 undergraduate students to evaluate the clarity and uniformity of the questionnaire items. For the reliability analysis, Cronbach's alpha was utilized, and the minimum level of acceptable reliability was set at 0.70 (Taber, 2018).

Ethical Considerations

All ethical guidelines were completely adhered to in this study. Informed consent was required for all participants before data was collected. Participation in this study was completely voluntary, and participants were informed regarding their right to exit the study at any time. Participants' identities were kept anonymous, and all collected data was only used for academic purposes. Additionally, there was no infliction of physical or psychological harm of any kind to participants during the course of the research.

Data Collection Procedure

The study obtained permission from the chosen higher education institutions. Research participants completed questionnaires which were collected, screened for accuracy, and determined to be complete. Data was categorized and statistically analyzed using SPSS Version 26.

Data Analysis Techniques

The data collected were analyzed using SPSS Version 26. Participants' responses were summarized using descriptive statistics, including mean and standard deviation. Pearson correlation analysis and regression analysis were used to determine the relationships and the predictive effects of inquiry-based teaching practices on learner autonomy, motivation, and self-regulated learning, respectively. The significance of the relationships among the study variables was determined using hypothesis testing.

Results and Discussion

The effects of inquiry-based teaching practices on learner autonomy, motivation, and self-regulated learning among undergraduate students were examined based on the data analyzed with SPSS Version 26.

**Table 1
Gender of Respondents**

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	118	47.2	47.2	47.2
Female	132	52.8	52.8	100.0
Total	250	100.0	100.0	

The findings indicate that 118 (47.2%) respondents were male, whereas 132 (52.8%) respondents were female. The results demonstrate a balanced gender representation among participants.

**Table 2
Age Distribution of Respondents**

Age Group	Frequency	Percent	Valid Percent	Cumulative Percent
18–20 Years	96	38.4	38.4	38.4
21–23 Years	121	48.4	48.4	86.8
24–26 Years	33	13.2	13.2	100.0
Total	250	100.0	100.0	

The majority of respondents, 121 (48.4%), belonged to the age group of 21–23 years, followed by 96 (38.4%) respondents aged between 18–20 years. Only 33 (13.2%) respondents were between 24–26 years of age.

**Table 3
Academic Discipline of Respondents**

Discipline	Frequency	Percent	Valid Percent	Cumulative Percent
Education	72	28.8	28.8	28.8
Business	61	24.4	24.4	53.2
Social Sciences	58	23.2	23.2	76.4
Computer Science	59	23.6	23.6	100.0
Total	250	100.0	100.0	

The respondents represented different academic disciplines. The highest number of participants belonged to the Education discipline with 72 (28.8%) respondents, followed by Business with 61 (24.4%) respondents.

Table 4
Semester/Year of Study

Semester	Frequency	Percent	Valid Percent	Cumulative Percent
1st-2nd Semester	54	21.6	21.6	21.6
3rd-4th Semester	88	35.2	35.2	56.8
5th-6th Semester	69	27.6	27.6	84.4
7th-8th Semester	39	15.6	15.6	100.0
Total	250	100.0	100.0	

The table reveals that most respondents, 88 (35.2%), belonged to the 3rd-4th semester category, followed by 69 (27.6%) respondents from the 5th-6th semester category.

Table 5
Descriptive Statistics of Study Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Inquiry-Based Teaching Practices	250	2.10	5.00	4.12	0.61
Learner Autonomy	250	2.30	5.00	4.05	0.57
Motivation	250	2.40	5.00	4.18	0.54
Self-Regulated Learning	250	2.20	5.00	4.09	0.59
Valid N (listwise)	250				

The descriptive statistics revealed high mean scores for all study variables. Inquiry-Based Teaching Practices obtained a mean score of 4.12, indicating positive student perceptions regarding inquiry-oriented instructional practices. Motivation recorded the highest mean value ($M = 4.18$), suggesting strong academic engagement among students. Learner Autonomy and Self-Regulated Learning also demonstrated high mean values, reflecting positive independent learning behaviors and self-management skills among respondents.

Table 6
Pearson Correlation Matrix

Variables	1	2	3	4
1. Inquiry-Based Teaching Practices	1			
2. Learner Autonomy	.684**	1		
3. Motivation	.721**	.638**	1	
4. Self-Regulated Learning	.703**	.676**	.695**	1

Note: Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis demonstrated significant positive relationships among all variables. Inquiry-Based Teaching Practices showed a strong positive relationship with Learner Autonomy ($r = .684$, $p < .01$), Motivation ($r = .721$, $p < .01$), and Self-Regulated Learning ($r = .703$, $p < .01$). The findings indicate that higher levels of inquiry-based teaching practices were associated with increased learner autonomy, motivation, and self-regulated learning skills.

Table 7
Model Summary: Inquiry-Based Teaching Predicting Learner Autonomy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.684a	.468	.466	.418

a. Predictors: (Constant), Inquiry-Based Teaching Practices

The model summary indicates that Inquiry-Based Teaching Practices explained 46.8% of the variance in Learner Autonomy ($R^2 = .468$). This reflects a strong predictive relationship between inquiry-oriented teaching and learner autonomy.

**Table 8
ANOVAa**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.472	1	38.472	218.103	.000b
Residual	43.732	248	.176		
Total	82.204	249			

a. **Dependent Variable:** Learner Autonomy
b. **Predictors:** (Constant), Inquiry-Based Teaching Practices

The ANOVA results revealed that the regression model was statistically significant, $F(1,248) = 218.103$, $p < .001$. This indicates that Inquiry-Based Teaching Practices significantly predicted Learner Autonomy.

**Table 9
Coefficientsa**

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	1.204	.192		6.271	.000
Inquiry-Based Teaching Practices	.691	.047	.684	14.768	.000

a. **Dependent Variable:** Learner Autonomy

The coefficient table indicates that Inquiry-Based Teaching Practices significantly predicted Learner Autonomy ($\beta = .684$, $t = 14.768$, $p < .001$). Therefore, H1 was accepted.

**Table 10
Regression Analysis: Inquiry-Based Teaching Predicting Motivation**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.721a	.520	.518	.376

The regression findings revealed that Inquiry-Based Teaching Practices explained 52.0% of the variance in students' Motivation. The relationship was statistically significant.

**Table 11
Coefficientsa**

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	1.015	.174		5.833	.000
Inquiry-Based Teaching Practices	.768	.047	.721	16.381	.000

The results demonstrated that Inquiry-Based Teaching Practices significantly influenced Motivation ($\beta = .721$, $t = 16.381$, $p < .001$). Therefore, H2 was accepted.

**Table 12
Regression Analysis: Inquiry-Based Teaching Predicting Self-Regulated Learning**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.703a	.494	.492	.421

The findings showed that Inquiry-Based Teaching Practices explained 49.4% variance in Self-Regulated Learning. The model indicated a strong predictive relationship.

**Table 13
Coefficientsa**

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	1.128	.181		6.232	.000
Inquiry-Based Teaching Practices	.719	.046	.703	15.556	.000

a. Dependent Variable: Self-Regulated Learning

The coefficient analysis revealed that Inquiry-Based Teaching Practices significantly predicted Self-Regulated Learning ($\beta = .703$, $t = 15.556$, $p < .001$). Therefore, H3 was accepted.

Table 14
Summary of Hypotheses Testing

Hypothesis	Statement	Decision
H1	Inquiry-based teaching practices have a significant positive effect on learner autonomy.	Accepted
H2	Inquiry-based learning has a significant positive relationship with students' motivation.	Accepted
H3	Inquiry-based learning significantly enhances self-regulated learning skills.	Accepted

All hypotheses were accepted because the statistical findings revealed significant positive effects of Inquiry-Based Teaching Practices on Learner Autonomy, Motivation, and Self-Regulated Learning among undergraduate students.

The statistical results from this research showed that the type of teaching that promotes inquiry has an impact on motivating university students and enhancing their autonomy and self-regulated learning. Descriptive statistics showed participants experienced teaching that involved high levels of inquiry and resulted in positive outcomes. Positive correlations were found between teaching practices that involved inquiry and the dependent variables. Lastly, teaching practices that included inquiry were the main predictors of autonomy, motivation, and self-regulated learning of the participants. This shows teaching practices that involve a high degree of inquiry enable learner autonomy, engagement, self-directed learning, self-regulation, and self-reflection in university students.

Discussion

Inquiry-Based Teaching and Learner Autonomy

The study's results found that self-directed learning was significantly greater for undergraduate students learning through an inquiry-based teaching approach. The strong positive correlation suggests that students learning through an inquiry-based teaching approach became independent, self-responsible, and proactive participants of the learning process. Teaching through an inquiry-based approach promotes learners to ask questions, explore issues, and engage in activities that promote the ability to learn independently and think reflectively. The results of this study correlate with those of Pedaste et al. (2015) and Feri et al. (2016) on the improvement of learners' independence and responsibility in an inquiry learning context. In the same vein, Vieira (2020) asserted that in a context that promotes a pedagogy of teaching through inquiry, learning becomes independent, active, and collaborative.

Inquiry-Based Learning and Student Motivation

The investigation found that learning through inquiry had a noticeable impact on the motivation and engagement levels of students in a classroom. Students subjected to teacher-supported inquiry demonstrated higher engagement, inquisitiveness, and interest. Using inquiry as a teaching and learning approach provides students with the space, time, and opportunity for both exploration and significant learning. This enhances students' intrinsic motivation and encourages them to be actively engaged in classroom activities. Ryan and Deci (2020) state that learning environments that provide students with autonomy also support and develop students' intrinsic motivation. The findings were in agreement with the research of Archer-Kuhn and MacKinnon (2020) and the research of Lin et al. (2020) as both studies noted that when teachers use inquiry-based approaches, students' confidence in academic work and classroom engagement as well as positive attitudes towards learning are increased.

Inquiry-Based Learning and Self-Regulated Learning

The study results demonstrated that self-regulated learning skills of students were advanced through inquiry-based learning. As a part of the inquiry-based learning practices, students were encouraged to set their own learning goals, manage their own learning activities, and assess the results. Through reflective and problem-solving activities, learners managed their learning processes. Panadero (2017) and Zimmerman et al. (2017) argued that learners develop self-regulated learning through learning activities that are reflective and problem-solving. Greene et al. (2018) also argued that learning environments that are self-directed and autonomous promote self-monitoring and learning that is strategic.

Inquiry-Oriented Pedagogy and Lifelong Learning

This study highlighted the importance of an inquiry-based learning system in fostering critical thinking and lifelong learning skills. Students in the inquiry learning sight framework exercised refined problem-solving skills and strengthened reflective thinking. Inquiry learning allows students to actively participate in constructing their knowledge as opposed to receiving information, which enables learning beyond the school environment and throughout their lives. These results are in agreement with the findings in Lazonder and Harmsen (2016) and Gómez and Suárez (2020), where it was shown that the elements of inquiry learning fostered higher-order thinking skills and the essential skills of lifelong learning in the twenty-first century.

Discussion Linked with Theoretical Framework

The results have provided positive reinforcement to the underlying theories of the study. Constructivist Learning Theory explains how knowledge is built through active participation and experience. This is analogous to how reflective learning encourages active exploration (Kay & Kibble, 2016). Self-Determination Theory and the results are in agreement because inquiry-driven learning environments are able to meet students' psychological needs of autonomy and competence, and therefore, enhance intrinsic motivation (Ryan & Deci, 2020). In addition, Social Cognitive Theory posits that self-regulated learning is fostered through self-efficacy and reflective observation (Schunk & DiBenedetto, 2020). Thus, it can be concluded that inquiry-based teaching methods in higher learning institutions are able to cultivate learner autonomy, motivation, self-regulation, and lifelong learning capabilities.

Conclusion

This study focused on the impact of implementing inquiry-based teaching approaches on learner autonomy, motivation, and self-regulated learning of undergraduate students at tertiary institutions. The study found that instruction based on inquiry strengthened students' independent learning, motivation, and self-regulation. The study established a statistically significant and affirmative correlation between the practice of teaching through inquiry and the study's dependent variables. Participants in the study showed higher levels of engagement and responsibility, as well as reflective learning, in a teaching practice characterized by an inquiry-based learning environment. Furthermore, the study suggested that teaching through inquiry develops critical thinking and problem-solving skills as well as learning to learn and other related competencies that are needed in the twenty-first century teaching and learning. Finally, the study established that teaching through inquiry is a learner-centered teaching practice that helps to develop autonomous, motivated, and self-regulated learning of undergraduate students.

Recommendations

For Teachers

Teachers must incorporate inquiry based activities including problem solving tasks, projects, discussions, and reflective activities in their teaching. They must also promote collaborative and individual learning activities that can engage students in active conceptual exploration and participation in the process of knowledge construction.

For Higher Education Institutions

Universities should advocate for curriculum construction that prioritizes inquiry and the active engagement of students. In addition, universities should implement professional development and training seminars that introduce teaching faculty to the skills necessary for executing various inquiry-based instructional strategies.

For Policymakers

Student-centered pedagogy that incorporates inquiry learning, critical thinking, and learner autonomy should be championed by educational policymakers. They should also be committed to innovative instructional practices and the development of teaching environments based on inquiry in higher education.

Practical Implications

The findings of this research are significant for enhancing both education and learning at the tertiary level. Some of the probable advantages of inquiry-based teaching are increased engagement in class, greater independence and reflection among learners. Some of the probable advantages of the inquiry-based teaching approach further seem to be the improvement of the independence of learners, their motivation, and self-regulated learning. This approach is aligned with the aims of promoting lifelong learning and equipping learners to tackle diverse challenges in their academic and professional careers.

Contribution to Knowledge

This research adds quantitative supports regarding the efficacy of higher education inquiry-based inquiry pedagogy in educational literature design. This study also builds the literature of learner autonomy by analyzing the simultaneous effects of inquiry-based pedagogy on learner autonomy, motivation, and self-regulation. Lastly, the study brings research evidence on the developing association of inquiry-based learning, intrinsic motivation, and self-regulation among undergraduate students.

Limitations of the Study

The study includes the following limitations: the first is that this research focuses on higher education institutions in Karachi, Sindh, therefore, this may indicate that the findings may be less useful in other education settings; the second is that the use of a quantitative and cross-sectional design constrained the study's ability to examine the in-depth experiences and the study's participants' perceptions. Finally, the study is based on the use of self-reported responses, creating an opportunity for response bias; therefore, this may also create a scenario of a subjective data interpretation.

Future Research Directions

Future research should utilize mixed-method design to assess both inquiry-based learning experiences and the educational outcomes associated with such learning. Research should also analyze differences in inquiry-based practices at various educational levels, as well as within and across disciplines, through comparative studies. Finally, to understand the impact of inquiry-based learning on the development of learner autonomy, motivation, and self-regulation, it will be necessary to conduct a series of studies that focus on the same population over an extended period of time.

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