

<https://doi.org/10.36719/2706-6185/42/52-61>

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Research on Application of Inquiry-Based Learning in Private and Public Schools in Azerbaijan

Abstract

The goal of the research is to investigate the role of Inquiry-Based Learning (IBL) in developing students' research skills in both public and private schools in Azerbaijan. Many public schools in Azerbaijan still rely on traditional teaching methods, but in contrast, private and international schools have demonstrated effective practices in cultivating students' research skills through IBL. This study examines the connection between student outcomes, instructional choices, and school type (public versus private), with an emphasis on the implementation of Inquiry-Based Learning. The study used a quantitative research design. The data were collected by a questionnaire from teachers in private and public primary schools. Results showed that there is a relationship between types of schools and using Inquiry-Based-Learning (IBL). Instructional practices are significantly shaped by control variables, particularly the experience of teachers. The impact on students' academic performance, scientific worldview, and research skills is highlighted in the study, which also emphasizes the need for targeted professional development to close gaps in instructional approaches.

Keywords: *inquiry, instruction, school, public, private, primary school*

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Azərbaycanda dövlət və özəl məktəblərdə tədqiqat-əsaslı təlimin (TƏT) tətbiqi üzrə araşdırma

Xülasə

Tədqiqatın məqsədi Azərbaycanda dövlət və özəl məktəblərdə şagirdlərin tədqiqat bacarıqlarının inkişafında Tədqiqat-əsaslı Təlimin (TƏT) rolunu araşdırmaqdır. Azərbaycanda bir çox dövlət məktəblərində tədrisdə hələ də ənənəvi təlim metodlarından istifadə olunur, lakin özəl və beynəlxalq məktəblər TƏT vasitəsilə şagirdlərin tədqiqat bacarıqlarının inkişafında səmərəli təcrübələr nümayiş etdirirlər. Bu tədqiqat şagirdlərin nailiyyətləri, təlim metodları və məktəbin tipi (dövlət və ya özəl) arasındakı əlaqəni, xüsusilə Tədqiqat-əsaslı Təlimin tətbiqi kontekstində araşdırır. Tədqiqatda kəmiyyət araşdırma metodu tətbiq olunmuşdur. Məlumatlar özəl və dövlət məktəblərinin ibtidai sinif müəllimləri arasında sorğu yolu ilə toplanmışdır. Nəticələr göstərmişdir ki, məktəbin növü ilə Tədqiqat-əsaslı Təlimin tətbiqi arasında əlaqə mövcuddur. Tədris metodları əsasən dəyişənlər, xüsusilə müəllimlərin təcrübəsi tərəfindən əhəmiyyətli dərəcədə formalaşır. Tədqiqatda şagirdlərin akademik göstəricilərinə, elmi dünyagörüşünə və tədqiqat bacarıqlarına təsir vurulanmış və tədris yanaşmalarındakı fərqləri aradan qaldırmaq üçün hədəfli peşəkar inkişafın zəruriliyi qeyd edilmişdir.

Açar sözlər: *sorğu, tədris, məktəb, dövlət, özəl, ibtidai məktəb*

Introduction

Research Problem

A clear research gap exists regarding the thorough examination of the effects of different pedagogical approaches on primary school students in the ever-changing field of education, where the efficacy of different teaching methods is constantly questioned. In particular, there are not many studies comparing the efficacy of IBL versus traditional teaching approaches in private and public schools, especially when it comes to primary school students' development of their scientific worldview, research skills, and academic performance.

Teaching in some schools in Azerbaijan is still conducted using the traditional teaching methods. Students with poor research skills have low levels of conducting independent research, ability to express their views, writing essays, including the ability to acquire knowledge through the IBL rather than memorization, problem-solving and independent decision-making. The development of these skills and abilities is possible through the IBL, which is one of the approaches used in modern learning and teaching.

Although the National Curriculum was adopted in Azerbaijan in 2006 and a number of reforms were carried out in the field of education, classes in primary grades in many public and private schools are still conducted using traditional teaching methods. Unlike schools with traditional teaching methods, private and international schools in Azerbaijan have best practices for developing students' research skills. In such schools, students work independently or with their peers based on research topics presented to them and as a result of active teaching methods. Based on topics taught through inquiry-based learning, students in these schools are able to work independently, make reasoning and express their opinions individually or in cooperation with their peers. Therefore, it is very important to explore what is the role of IBL in developing students' research skills in public and private schools.

The history of teaching through IBL goes back to ancient times and is clearly seen in the teaching of Confucius and Socrates (Friesen & Scott, 2013). Spinoza and other philosophers of the seventeenth century showed that knowledge was obtained not by transmitting facts, but by playing with ideas and thoughts. A well-known American educator and philosopher John Dewey suggested that the best way to learn is to "learn by doing it". The Inquiry-Based Learning is based on the theories of Lev Vygotsky, John Dewey, Jean Piaget and others (Koch, 2002; Slavin, 2018). This theory is associated with the theory of constructivism. According to this theory, knowledge is not acquired in a ready way, but it is built, discovered and created. From ancient times, Confucius said: "Tell me and I will forget; Show me and I will remember; Involve me and I will understand.

Literature Review

Inquiry-Based Learning (IBL) vs. Traditional Way of Learning

In comparison to a traditional way of teaching IBL affects students' performance greatly. In classes where an instruction is organized by means of traditional ways of teaching and learning, not students, but a teacher becomes in the center of the learning process.

In contemporary world several studies have been conducted to identify the role and impact of IBL in students' performance in comparison to a traditional way of learning. It has been discussed by a great number of authors in literature. The recent study reports that students who are taught through inquiry-based learning show better performance than those taught by traditional methods (Shaheen, Alam, Mushtaq, & Bukhari, 2015; Heindl, 2019). Based on another study students can produce high level of learning and long-term retention of knowledge in comparison to students who have been taught through traditional methods of teaching (Blanchard, Sourtherland, & Sampson, 2010).

IBL implementation and its effects on teachers

The application of IBL teaching strategies affects the teachers' subject-matter expertise. Several studies, including Kahle et al. (Kahle, 2000), discovered a favorable correlation between teacher professional development and the application of IBL in the classroom. Professional development happens once before teachers begin implementing IBL in the classroom in certain situations, and it continues in other situations long after teachers are first introduced to IBL. As part of the transition

to IBL, numerous studies and school districts incorporate professional development for teachers. In contrast to an IBL classroom, where there is a degree of uncertainty related to a complex teaching/learning relationship, a traditional classroom allows the teacher to plan every minute of the lesson (Leikin & Rota, 2006; Phelan, 2005).

The Importance of IBL

One of the studies proves that IBL plays a significant role in developing students' scientific skills (Şimşek & Kabapınar, 2010). Another study has revealed that students who were involved in structured or guided inquiry at school more frequently, they remembered how they could deal with certain types of problems and how they could be involved in scientific debates (Schmid, & Bogner, 2015). A number of authors have recognized the importance of IBL in teaching different subjects. According to the authors IBL becomes effective in teaching Math and Science classes based on IBL approach to develop students' research and scientific process skills (Mahmood, Parveen, & Arshad Dahar, 2019; Şahintepe, Erkol & Aydoğdu, 2020).

In comparison to these findings, another study has revealed that when there is an experimental group participating in the study conducted, it should not be considered that outcomes and increased academic achievement of students are based only on the inquiry-based learning, since IBL used in science education, had a great effect on students' achievement rather than on science process skills of students and their academic attitude towards science (Aktamiş et al., 2016).

The recent study concluded that the expectations which is based on stereotypes of teaching through IBL in different teaching cultures has not confirmed itself (Huang, Doorman, & Joolingen, 2021). Having conducted a questionnaire among students in two teaching and learning cultures, the findings showed that teaching through IBL does not confirm the stereotype that students in a Western culture can be more successful (Eastern & Western).

Science Classroom Practice in Public and Private Schools

The research conducted demonstrates highly significant statistical distinctions in the teaching practices reported by science educators in private and public primary schools. Private school teachers indicate a greater adherence to recognized "best practices," including collaborative, student-centered, and IBL (Dickson, et al., 2015). Both private and public school teachers express concerns about insufficient resources for conducting practical science experiments. However, private school teachers, uniquely, extend this concern to encompass various teaching materials. The findings offer insights that could assist both private and public school sectors in addressing their teachers' needs and optimizing science education.

A closer look to the literature on IBL and its role in developing students' research skills and improving their academic performance in private and public schools, several gaps and shortcomings have been revealed. Most of the previous studies focused mainly on teaching Math and Sciences through the IBL approach and there were a very limited number of studies related to social studies. Although studies related to social sciences have been conducted by a few researchers, this issue remains insufficiently explored. Moreover, although there are many studies, the research conducted related to primary school students in comparison to secondary students remains limited. At some private and public schools, study related to IBL at public and private schools was conducted only related to teaching science subjects. To our knowledge, no prior studies related to the role of IBL in developing public and private school students' research skills have been conducted in Azerbaijan up to date, except for a few studies related to Problem-based Learning.

Purpose of Research

The purpose of this study is to investigate the relationships between teachers of private and public schools who teach through IBL or use traditional teaching methodology which plays an important role in primary year students' academic performance, acquisition of research skills, development of their scientific worldview and critical thinking skills.

Research question

Is there a relationship between the type of school (private and public) and the type of instruction (IBL) in developing students' research skills?

Null Hypothesis: There is no significant relationship between the type of school (private and public) and the type of instruction (IBL) in developing students' research skills.

Theoretical/Conceptual Framework

According to the conceptual framework of this study, students' academic performance, their ability to conduct research, and the formation of their scientific worldview are all directly impacted by the type of instruction that teachers in both public and private schools use, whether it is IBL or traditional teaching methodologies. The variables listed below are outlined in the framework:

Dependent Variable:

Participation in Inquiry-Based Learning (Type of Instruction): This is dependent variable that reflects the type of instruction that teachers use, which can be classified as either Inquiry-Based Learning (IBL) or traditional teaching methodologies.

Independent Variable:

Type of School - the independent variable that differentiates the educational context which is classified as either public or private.

Control Variables:

1. Teachers' Age – the age of teachers, is considered as a control variable to account for potential variations in instructional approaches based on age.

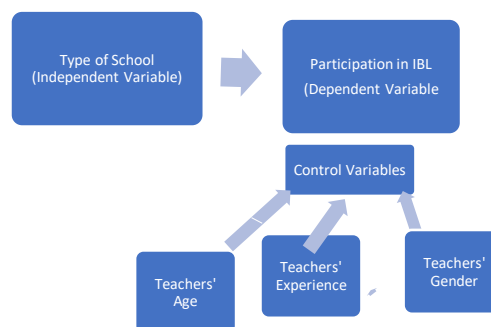
2. Teachers' Years of Experience – the number of years teachers have been in the profession, serving as a control variable to explore any correlation between teaching experience and instructional methods.

3. Teachers' Gender – the gender of teachers, included as a control variable to investigate potential gender-related influences on instructional choices.

The framework suggests that the nature of the school being as public or private - acts as a contextual background that affects the instructional strategies teachers choose to use. The main focus is on how students' academic performance, their development of a scientific worldview, and their acquisition of research skills are affected by teachers' choices to use either traditional methodologies or IBL.

Teachers' age, years of experience, and gender are combined as control variables to reduce the possibility of confounding variables and to provide a more complex picture of the relationship between the selected teaching strategies and the desired student outcome. The goal of this framework is to illuminate the complex interplay between contextual factors, instructional choices, and educational outcomes in the varied context of public and private schools.

Conceptual Framework



Method

Subjects: The population of the study are all primary school teachers. The sample size of the study was 223 primary school teachers: 121 were from public schools, 71 from private schools, 31 teachers had not selected the appropriate school type.

Sampling: single-stage, convenient sampling

Instruments & Data Collection

Data were collected by sending a Google Form questionnaire to several public and private schools in Baku. The data was collected during 18-25 October 2023 through online Google Form questionnaire format. Then the quantitative data was downloaded as an Excel file and imported to Stata.

For this study structured questionnaires in Azerbaijani and English languages both for local public and international school teachers were developed. The questionnaire consisted of 6 sections. Section 1 was the consent of participants. Section 2 consisted of 6 demographic questions. Section 3 “Exposure to Inquiry-Based Learning (IBL)” and consisted of 3 questions. Section 4 “Developing Students’ Research Skills,” contained 5 questions with the Likert scale of 1 to 5 (1 is strongly disagree, 5 strongly agree), Section 5 “Students’ Academic Achievement” had 4 questions and Section 6 “Students’ Attitudes Towards IBL” with 5 questions with the Likert scale of 1 to 5 (1 is strongly disagree, 5 strongly agree) and Section 6 was “Additional Comments”.

Analysis applied

Quantitative descriptive analyses and Chi Square analyses were conducted

Results

Table 1
Type of School

Type of School	Freq.	Percent	Cum.
Public	121	63.02	63.02
Private	71	36.98	100.00
Total	192	100.00	

The table presents that there are 121 participants from public schools and 71 participants from private schools. The percentage indicates that 63.02 % of the participants are from public schools and 36.98 % of the participants are from private schools.

Table 2
Participation in IBL activity at school

Participation in IBL activity at school	Freq.	Percent	Cum.
No	90	40.36	40.36
Yes	133	59.64	100.00
Total	223	100.00	

The table presents the distribution of participants based on their participation in IBL activities at school. There are 90 participants (40.36 %) who reported not participating in IBL activities at school.

A larger portion, 133 participants (59.64 %), reported participating in IBL activities at school. The majority of participants (59.64 %) reported participating in IBL activities at school, while 40.36 % indicated that they did not engage in such activities. These findings provide insight into the prevalence of IBL practices among the study participants.

Table 3
 Gender

Gender	Freq.	Percent	Cum.
Female	201	90.13	90.13
Male	22	9.87	100.00
Total	223	100.00	

The table presents that there are 201 female participants (90.13 %) and 22 male participants (9.87 %) who participated in the questionnaire.

Table 4
 Participation in IBL activities at school

Type of School	Participation in IBL activity at school		
	No	Yes	Total
Public	61	60	122
Private	19	52	71
Total	80	112	192

Pearson Chi2 = 10.2990 Prob = 0.001
 Cramer's V = 0.2316

The statistical analysis, with a p-value (Pr) of 0.001, indicates statistical significance, leading to the rejection of the Null Hypothesis. The Null Hypothesis suggests that there is no difference between private and public schools in choosing teaching through Inquiry-Based Learning (IBL). Therefore, with a p-value below the chosen significance level (commonly set at 0.05), there is evidence to suggest that there is a difference between private and public schools in their choice of teaching methods, specifically favoring IBL. Cramer's V = 0.2316 indicates that there is a small difference.

Table 5
 Participation in IBL activity at school

Participation in IBL activity at school	Age					Total
	25-30	31-35	36-40	41-45	above 46	
No	21	23	17	11	18	90
	23.33	25.56	18.89	12.22	20.00	100.00
	42.86	54.76	39.53	32.35	32.73	40.36
	9.42	10.31	7.62	4.93	8.07	40.36
Yes	28	19	26	23	37	133
	21.05	14.29	19.55	17.29	27.82	100.00
	57.14	45.24	60.47	67.65	67.27	59.64
	12.56	8.52	11.66	10.31	16.59	59.64
Total	49	42	43	34	55	223
	21.97	18.83	19.28	15.25	24.66	100.00
	100.00	100.00	100.00	100.00	100.00	100.00
	21.97	18.83	19.28	15.25	24.66	100.00

Pearson Chi2 = 6.00 Prob = 0.1995

First row has *frequencies*; second row has *row percentages*; third row has *column percentages* and fourth row has *cell percentages*

The table compares the distribution of participants across age groups based on their engagement in IBL activities. The Pearson Chi2 value is reported as 6.00 with a probability (Prob) of 0.1995. The p-value of 0.1995 is greater than the conventional significance level of 0.05, suggesting that there is no statistically significant association between age and participation in IBL activities.

Table 6
 Participation in IBL by teacher experience

Participation in IBL activity at school	Experience				up to 5	Total
	up to 5	5-8 years	9-12 years	more than 13		
No	0	19	8	35	28	90
Yes	1	16	11	70	35	133
Total	1	35	19	105	63	223

Pearson Chi2 = 6.11 Prob = 0.1910
 Cramer's V = 0.1655

Participants with varying levels of teaching experience show different levels of engagement in IBL activities. The Pearson Chi2 test results indicate that the observed differences in participation across experience categories are not statistically significant. While there are variations in the frequencies across experience categories, these differences are not considered statistically meaningful based on the given p-value of 0.1910.

Table 7
 Participation in IBL activities at school by gender

Participation in IBL activity at school	Gender		
	Female	Male	Total
No	80	10	90
Yes	121	12	133
Total	201	22	223

Pearson Chi2 = 0.26 Prob = 0.6079

Participants of both genders show different levels of engagement in IBL activities, with females being the majority in both categories. The Pearson Chi2 test results indicate that the observed differences in participation across genders are not statistically significant. While there are variations in the frequencies across genders, these differences are not considered statistically meaningful based on the given p-value of 0.600. The lack of statistical significance suggests that there is no strong association between gender and participation in IBL activities in this sample.

Discussion
Findings

In this study, we looked into the relationship between teachers' choice of instructional methods and the type of school (private or public), with a particular emphasis on the use of IBL. The impact of control variables, such as teachers' gender, age, and experience, on the observed patterns was also taken into account in this study. The results offer insightful information about the dynamics of teaching methods and how they might affect student performance.

Findings indicate that there is a statistically significant difference between private and public schools in their choice of teaching through IBL. However, the effect size (Cramer's v) suggests that the difference is small. The small effect size suggests that the observed difference, while statistically real, might not be of substantial magnitude.

Type of school and participation in IBL

According to the study, there is a statistically significant correlation between IBL participation and the kind of school. When comparing private schools to public schools, the former are more likely to implement IBL. This indicates the notion that educational decisions are influenced by institutional contexts.

Contextual Background Influence

Whether a school is public or private, its contextual background has a big influence on the instructional decisions made by teachers. Private schools in the country have a greater propensity to use IBL because they are frequently endowed with greater autonomy and resources. This emphasizes how crucial it is to take the larger institutional environment into account when determining how to shape educational practices.

Emphasis on Student Outcomes

The importance of student outcomes is highlighted by this research. Academic performance, the formation of a scientific worldview, and the development of research skills are all significantly impacted by the choice of instructional methodology, particularly the implementation of IBL. Students who participate in IBL demonstrate a more thorough and practical grasp of the material.

Practical Implications

These results point to the necessity of focused professional development initiatives for educators and administrators. The differences in teaching methods between public and private schools ought to be closed. To encourage the use of IBL, policymakers should take into account initiatives that offer opportunities for training and resources, especially to public school teachers.

Limitations

Although this study collected insightful information, it has also limitations. It is more difficult to determine causality when the data are cross-sectional. Additionally, the study was conducted in a specific geographical area, and caution should be exercised when generalizing the findings to other contexts.

Suggestions for future research

Future studies should go more deeply into the mechanisms that help or impede the implementation of IBL in various educational contexts. A more complex understanding of the causal relationships between institutional factors, teacher characteristics, and instructional choices may be obtained through longitudinal studies. Examining the viewpoints of educators and learners may enhance our comprehension of the observed patterns.

Recommendations

Incorporation of IBL in Curriculum

The following recommendations could be made to encourage the incorporation of IBL into the curriculum of both public and private schools. Given the observed association between school type and teaching method, promoting IBL in the curriculum could enhance student engagement and critical thinking skills in public schools in the country.

Professional Development for Teachers

To implement targeted professional development programs for teachers of public and private schools to enhance their skills in implementing IBL effectively. Considering the non-significant associations with teacher characteristics, investing in ongoing training and support is crucial for successful IBL implementation particularly at public schools.

Policy Support for IBL Programs

It is important to advocate education department of Baku for developing policies that support the development and implementation of IBL programs within public schools of Baku.

Conclusion

The study concludes that there is a statistically significant difference in the preference for IBL instruction between private and public schools. But it's important to remember that the effect size is tiny, as Cramer's v shows. This implies that even if the difference is statistically significant, its actual impact might not be great.

Analyzing how demographic characteristics affect IBL adoption, the results show that there is not enough data to make a statistically significant claim about the relationship between teachers' ages and IBL participation. The p-value, which is 0.191, is insufficient to reject the null hypothesis at the 0.05 significance level. Thus, it can be concluded that there is no a statistically significant correlation between the number of years of experience of teachers and their participation in IBL.

The study also emphasizes the lack of evidence supporting a statistically significant relationship between teachers' gender and the instructional strategies they choose. All of the findings highlight how complex the factors influencing the adoption of IBL are, and that gender, age, and years of experience may not be the most important factors in determining a teacher's preference for a particular style of instruction.

Although the statistically significant difference favoring IBL between private and public schools is notable, its practical implications should be interpreted cautiously due to its modest effect size and sampling technique. Together, these results add to the current conversation about successful teaching strategies by illuminating the complex relationship between the kind of school and the instructional options. Future research is needed to enhance our comprehension of the complex factors affecting teaching practices in various educational environments.

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Received: 04.10.2024

Revised: 18.11.2024

Accepted: 17.12.2024

Published: 30.12.2024