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Effect of Inquiry-based Teaching (IBT) in Second Language Pedagogy on Students' Academic Achievement

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Abstract: *In Pakistani education, English as a second language plays a vital role. It is taught as a compulsory subject to the students for fourteen years. Despite the fact, the standard of proficiency in English language is falling due to inappropriate methodologies employed in language pedagogy at school and college level, consequently students find English language as a barrier in pursuit of achieving excellent careers. The study attempts at finding out the impact of using inquiry based teaching (IBT) on students' achievement scores. IBT refers to involving students through question-answer mechanism to understand the concept under study. Experimental research with pre-test post-test control group design was conducted on a total of 156 students of VI grade, 78 students in experimental and 78 in control group for two months. The sample was selected as an intact group. An achievement test was administered to collect data from students. The data of 25 students from each group with 80% or above attendance was analyzed. The results of the study show that IBT methodology has positively significant effect on students' achievement score. Therefore the second language teacher may use IBT to enhance students' achievement score. Furthermore the study may be replicated for the use of IBT in second language teaching at different academic levels.*

Keywords: Inquiry-based Teaching, Academic Achievement, Second Language

Introduction

Language is a basic tool for communication of ideas, thoughts and feelings. It is growing need of the whole world to have a common language which can serve as mean of communication for the people living far apart in different areas of the globe to make the world a global village in real sense. English language is serving the purpose of a common language and bonding people, belonging to different nations and countries together. English language is the second language of several countries of the world. The people from the countries other than those where English is a native language have to learn it as a second language throughout their educational career. They need to focus the learning of the second language more than the learning of their fields of interest. It has become a big task to learn English as a Second Language (ESL) because the language functions as a human-capita l component. In fact the economic outcomes of language mastery have obtained growing interest in present times. Language proficiency performs a significant function in academic as well as professional life of individuals (Chiswick& Miller 2014).

Apart from labor market and economic aspect, language plays an important role in academic career of students. Nowadays there is so much tough competition in every walk of life and only the fittest survives, so the more achievement scores in academics a student scores, the more chances are there for him to excel in his education and professional life. In Pakistani situation achievement score is considered to be an important scale to measure learners' competency in academics especially at primary level where practical skills of students are not necessarily assessed. Therefore it becomes highly important for a student to earn higher grades in academics to be a part of the competition. The factor of language is highly important for the education of a student. The areas of the world wherein English is instructed as a second language, it becomes a barrier in students' academic success. It not only affects the learning of students but it has deep effects on their grade point averages (GPAs). Many research works indicate that English mastery serves a very critical function in the completion of academic courses for international students in the institutions wherein ESL is

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employed as an instructional medium, particularly those students who use or learn English as a second language (Li, 2010; Wardlow, 1999). In New York at Albany State University a study was conducted in which Light et al. (1987) found a statistically considerable and constructive relationship between the achievement of TOEFL and GPAs of 376 graduates from various countries.

Besides the positive relationship between academic success and the proficiency in English language, learning of the language affects other aspects of our life. Language helps to express dreams, opinions and hopes (Tavil, 2009). A variety of factors affect the process of learning like attitude, anxiety, motivation, aptitude, intelligence, achievement in learning, age etc (Shams, 2008). The learner's attitude is considered to be an essential aspect which affects language learning (Fakeye, 2010). It is recommended that an encouraging atmosphere should be created in classes to enhance students' affirmative approach for ESL and that could be achieved by using suitable methodologies and activities to teach English efficiently and successfully (Abidin, 2012). Gardner (1985) described that the learner's attitude towards learning second tongue has an essential function in enhancing motivation of pupils to study target language. Ultimately it influences their achievement. Language teachers, researchers and learners admit that inspiration and optimistic attitude of learner help in the learning of target language. In contrary to that a student having no liking for second language to communicate with others, the student does have unconstructive attitude and is not inspired in the learning of language (De Bot et al., 2005). The question arises here how to develop attitude towards a particular subject or the content of learning. During the course of education at all the levels, the teaching basically strives to bring an essential change in the learner (Tebabal & Kahssay, 2011) in terms of his/her inclination towards learning. The process of teaching refers to instructional methods, and a teacher can induce motivation and create attitude towards a particular subject through meaningful activities and appropriate methodologies.

It means appropriate methodologies can also have an important part in the instruction of foreign language because these methodologies are a way to achieve instructional objectives. If the methodology is not in accordance with the set instructional objectives, then it fails to achieve these objectives. As a result, question related to the efficacy of instructional methodologies on the learning of students constantly aroused significant concern in ideological research field of education (Hightower et al. 2011). To a greater extent, continuous low academic achievement by most of the students is primarily related with the use of inappropriate methodologies by teachers to deliver information to students (Adunola, 2011). Ayeni (2011) describes that the process of teaching contributes to bringing about required changes in students so that specific objectives could be achieved. An educator should be skilled enough to select an appropriate methodology according to the concept and content he/she is going to teach to achieve planned objectives. Adunola (2011) describes that teachers require being acquainted with several teaching methodologies that could detect the degree of complication of the idea to be taught.

Like other several developing countries, in Pakistan English has prevailed political and official communication until now. Recently dialogues on 'Education for All' and rise in the usage of English language in international family of nations have given universal aspect to teaching-learning process of English language in Pakistan, eventually creating it a complicated course of action especially for the distribution of resources and reaching standard required in the education of English language (Shamim, 2011).

English language is instructed as a core subject from pre-classes up to graduation level in Pakistan but most of the students remain unable to be proficient in it that in turn becomes a barrier in their academic career. The present standards of expertise in English language of school and university students do not match Pakistan's requisite need for the language (Shamim, 2011).

For language teaching, well known methodologies named as Grammar Translation method and Direct Method were used extensively in past. Grammar Translation method focused learning of what is in the language rather than learning of the language itself. It made learning of language a boring experience of

cramming never-ending series of impractical grammar or principles and vocabulary used to produce exact translation of stilted or literary text that is frustrating (Richards, 2014). Being passive technique, it does not allow learners to participate in the process of learning, consequently pupils do not have chance for practicing the language that is learnt, hence the objective of learning the target language cannot be achieved as per requirement.

On the other hand, the use of Direct Method that has been popular because of naturalistic approach of learning second language but in the 1920s exercise of Direct Method in public schools turned down in European countries. It turned down because it was difficult to execute in public schools, it required indigenous speakers or the fluency like indigenous speakers in the second language, it depended on the skills of a teacher rather than on a textbook and all the teachers were not expert adequately in the second language to keep to the principles of the method (Richards, 2014). Therefore, finding new methods for the teaching of EFL is required.

The current study focuses to find out an appropriate methodology for teaching-learning process of EFL at the level of primary classes. The researcher used inquiry-based teaching to teach English to Grade 3. The purpose of the study to check the effectiveness of Inquiry Based Teaching Method (IBTM) in remediation of learning loss of public primary school students in fostering acquisition of Basic English literacy skills and providing feedback on students' attitude towards Inquiry Based Teaching Method (IBTM) in languages and learning English. Inquiry Based Teaching Method (IBTM) can simply be deduced as "raising questions" or raising question by showing pictures to students taken as an equivalent methodology to instruction through communication design by teachers of English as a Foreign Language (EFL). Research has proved that inquiry-based teaching and learning is best fit in questioning, explanations and concept building of pure sciences (Bransford, Brown & Cocking, 2000; White &Frederiksen, 1998). The study aims to check the strength of Inquiry Based Teaching Method (IBTM) in fostering acquisition of English literacy skills for remediation of learning loss of public primary school students.

Relation of Language Proficiency and Achievement Scores of Students

In Pakistani education system where students learn English as a foreign language, but it is the language of textbooks, the medium of instructionin English medium schools, and the language of examination especially at Secondary School Certificate Examination (SSCE) and Higher Secondary School Certificate Examination (HSSCE) level for both English medium and Urdu medium schools. At university level English serves as a medium of both instruction and examination. Ultimately understanding of course content in classroom and reproducing it in examination require proficiency of language, so the students with high proficiency in English are likely to achieve higher score in exams.

In New York at the State University of Albany it was studied with results which reported that there was constructiverelationship between students' scores of TOEFL and their grade point averages (GPAs). The study was conducted on 376 international students (Light, Xu&Mossop, 1987). The same findings were also describedby Johnson (1988), who carried out a study for confirmation on 196 international undergraduates at the University of Wisconsin - Green Bay. He found comparatively less correlation between the scores of students in TOEFL and mean GPAs (Johnson, 1988). The pupils who got marks less than 500 got considerably less scores in comparison with those students who scored equal to or more than 500 in TOEFL. Moreover a few other studies described the similar results on the link between the GPAs of students and their proficiency of language (e.g., Light et al., 1991; Staynoff, 1997).Staynoff (1997) studied elements affecting achievement scores in academics of international students. The study was conducted on 77 students who had completed six months of their studies. The results found on the basis of the study had statistically considerableassociation ($r = .26$, $p = .01$) within marks of TOEFL and GPAs (Staynoff, 1997). It showed that the students with high TOEFL scores more probably got high GPAs and the pupils with low TOEFL scores more probably obtained low GPAs.

The pupilshaving low proficiency of English feel it hard to comprehend the content of a subject that is in English especially pure sciences and because of this reason students try to avoid this subject as they develop disliking for such subjects. Adegboye,(1993) reported that low competency in the language of English was one of the aspects leading to fall inperformance in Mathematics. In this study, he found that the students' achievement in the assessment of mathematics at Senior Secondary School Certificate Examination (SSCE) was low, but he moreover reported that the performance in English was more than the achievement in the subject of mathematics and he related this to low proficiency of reading. That was why he suggested that it was required to enhanceEnglish language teaching to enhance the learning of mathematics. Itsuokor, (1987)determined considerableassociationof the proficiency in English and performance in the assessments of academics or intelligence. Djihed, (2013) while studying problems of reading of the students of master classes in the Arab countries stated that majority of these students had to face problems in linguistics that was the basic factor for their problems in the ability to comprehend reading which eventually pushed them to failure in academics. Finally, he worked out that the problems with these students in comprehending reading amplified their problems of linguistics.

At college level most of the students cannot comprehend the language of questions in tests or exams so they are not able to give suitable answers which become the cause of their low performance.Jadie et al, (2012) described that low competency in language of English had been taken as an obstacle in learning and success in academics at the level of post-secondary education and this was why learners of English had not had the competency of the language needed to comprehend the matter in tests and the work related to their academics. Garcia-Vazquez et al, (1997) found that high proficiency in English language could assist in reading related to academics that indicated the effect of ESL on the performance of students inthe academicsof other disciplines.

The students with low proficiency in English cannot understand instructions of teachers in class and consequently they produce poor results in academics.Iliyas, (2011) reported that a lack of needed proficiency of English language (in case it was an instructional language) was the main problem leading to low comprehension of instruction by teachers which resulted due to low vocabulary of syntactic knowledge, less proficient background of language and concession in passing entry tests into present league of hierarchy of schools among learners as a source of comprehending problems.

Research Questions
1. Does IBT have impact on students' academic achievement of second language?
2. Does IBT have impact on students' knowledge level of cognitive domain?
3. Does IBT have impact on students' comprehension level of cognitive domain?
4. Does IBT have impact on students' application level of cognitive domain?
5. Does IBT have impact on students' analysis level of cognitive domain?
6. Does IBT have impact on students' synthesis level of cognitive domain?
7. Does IBT have impact on students' evaluation level of cognitive domain?

Hypotheses
Ho1: There is no significant difference in students' academic achievement taught through IBT and taught through traditional teaching

Ho2: There is no significant difference in students' knowledge level of academic achievement taught through IBT and taught through traditional teaching

Ho3: There is no significant difference in students' comprehension level of academic achievement taught through IBT and taught through traditional teaching

Ho4: There is no significant difference in students' application level of academic achievement taught through IBT and taught through traditional teaching

Ho5: There is no significant difference in students' analysis level of academic achievement taught through IBT and taught through traditional teaching

Ho6: There is no significant difference in students' synthesis level of academic achievement taught through IBT and taught through traditional teaching

Ho7: There is no significant difference in students' evaluation level of academic achievement taught through IBT and taught through traditional teaching

Research Methodology

The purpose of the research work was to explore the impact of IBT methodology in teaching learning of second language (English) on students' achievement scores, attitude towards the second language and the methodology at elementary level. In this chapter the researcher described and elaborated the design and procedure of the study. The researcher provided details about population, sample, sampling technique, development of research tools their validity and reliability.

Research Type

The study aimed at exploring the impact of IBT in classroom for instruction and acquiring skill of second language at elementary level, so the researcher used experimental research to study the problem.

Research Design

The researcher adapted Pre-Test, Post-Test Control Group design because it was important to evaluate students' change in academic achievement and attitude towards second language and IBT. Thus the design was appropriate as the researcher could study the differences before and after the treatment. This design was also helpful to judge whether the samples of experimental group and control group were comparable. Control group was taught through traditional method that was lecture method as it was commonly used to teach second language while IBT was used to teach experimental group to analyze the effects of treatment by comparing the data of pre-test and post-test.

Target Population

The results of the study wereto be generalized on the students of Grade 6 for English. Hence the students of elementary classes in the province of Punjab were taken as target population.

Accessible Population

The accessible population of the research was the students of Grade 6 from27 schools of Bhakkar city.

Sampling Technique

Samples for experimental and control group were selected from Government Model Elementary school ChahChimnyofBhakkar city because the school was easily approachable for the researcher and the school authorities were willing to cooperate in the study. There were two sections of Grade 6 in the school. Researcher selected the two sections of Grade 6 for the study. These sections had already been made equivalent on the bases of students' achievement scores in their previous exam that was conducted by Punjab Examination Commission(PEC). The researchers took one intact section as experimental group and while the other as control group. In the study the two sections with their full strength of students were selected because the school authorities did not permit to separate students for the study to avoid any kind of disturbance in their usual studies. However the researcher conducted pre-test and post-test for all the students in both the sections but the data of only those students were included in the analysis whose attendance was 80% or above during the experimentation and provided complete data of pre-test and post-test of research tools.

In this way intact sampling technique was used to select the sample and the data of 25 such students having 80% or above attendance during the experimentation from both the groups was analyzed and included in the study. Both the sections A and B were equivalent with respect to number of students, their achievement scores in PEC exam and the qualification of the teachers who were teaching these sections. The Section A of

the Grade VI was taken as experimental group and section B of the Grade VI was taken as control group randomly.

Research Tools
An achievement test developed out of the content included in the book of English for Grade 6.

Achievement Test
Researcher made achievement test was utilized to calculate achievement score of students. The researcher developed this achievement test from Textbook of English for Grade VI. The researcher selected 24 SLOs which were related to English Grammar from all the units of the mentioned textbook. 25 MCQs were developed according to the selected SLOs. All the MCQs carried equal marks. After that the test was subjected to validation process. The test was discussed with subject matter experts and improved as per their opinion and advice. It was then subjected to pilot testing on 101 students of Grade VII. According to the results of pilot testing the discrimination level of item 8 was 0.074 which showed that it was highly difficult for the students, but the item was not removed from the test because of the fact that the students were not taught most of the grammar portion of the course while the researcher selected only grammar exercises for the study to check language competency of the students.

There were 25 items in total out of which 7 (28%) items are of knowledge level, 5 (20%) are of comprehension level, 5 (20%) are of application level, 2 (8%) are of analysis level, 3 (12%) are of synthesis level and 3 (12%) are of evaluation level.

The difficulty level and discrimination index of achievement test. The reliability of all the items is above 0.5 therefore according to reliability analysis all the items are accepted. The difficulty scores below .30 indicate the difficult questions and above the .75 indicate the easy questions. There is no question which have zero or negative discrimination index, so all the questions are accepted for final testing.

Procedure of the Experimentation
The experiment was started in January 2018 and ended in February 2018. At this time of the year the students of both the groups had almost completed their syllabus. The researcher had total 50 working days excluding Sundays. The researcher took 25 lectures of experimental group and 25 lectures of control group on alternate days to avoid disturbance in their routine studies. Two days out of 50 days were utilized to collect data of pre-test and post-test from the understudy students. Duration of each class period was 40 minutes as it was set by the school. The time of the day that was selected for the period was 10:00am to 10:40am. Twenty four lessons were planned for each group according to the SLOs selected from textbook of English for Grade 6. The selected SLOs were only about grammar. Each lesson plan was prepared for one period as per the pattern of lesson plan provided in teacher's guide designed by Directorate of Staff Development (DSD) Ministry of Education Punjab. Both experimental group and control group were taught by the researcher to control the variable of teacher personality.

The control group was instructed through simple method of lecture which was entirely teacher oriented pedagogy, and the lesson plans were prepared accordingly. The researcher demonstrated the selected concepts, but the students were not given any activity so students' participation was almost zero. The homework they were assigned was only cramming of definitions and information given in the textbook.

The experimental group was instructed through Inquiry Based Teaching (IBT) methodology and inductive model of teaching was used to implement the methodology. In the process the teacher played the role of a facilitator by asking questions which were mostly referential questions with open ended answers that the students had liberty to answer according to their own perception as they were active partner in the process of learning. Exemplary sentences were either written on the white board or asked orally to storm students'

brain about the target grammatical concepts selected for the study from the textbook of Punjab Textbook of English for Grade 6. The students' correct or wrong responses were debated in the class through questions raised by the teacher with the students until they reach the correct answers by understanding the concepts. Very often students were invited to note their responses on the white board to share those responses with the class and other students were given opportunity to debate on the responses. The learning of the students was assessed through their correct answers. In this way students were engaged in the process of learning and their curiosity was aroused through continuous question answer sessions. The daily lessons were planned accordingly. At the closing stage of the experimentation the pupils of both experimental and control groups took the researcher made achievement test and data on the mentioned questionnaires were collected and analyzed.

Ethical Considerations
1. Both the sections were kept intact.
2. Experiment was carried out according to the routine and timings of the school.
3. The school authorities and all the participant students were taken into confidence that the data collected during the experiment would be used only for the purpose of research.
4. Data collected individually was not discussed in the classes.
5. Marks were not mentioned on the achievement test, and its results were not discussed and displayed in the classes.
6. No student was excluded during teaching and learning process.
7. It was ensured that the students' personality and learning might not be harmed.

Data Collection
Data from both the groups was collected on hard copies of all the three tools which were provided to all the students individually and the students were provided with adequate time to provide the data.

Data Analysis
To compare mean scores of experimental and control groups in pretest and posttest the data was analyzed through independent sample t-test and paired sample t-test by using SPSS according to the requirement of the study.

Analysis of achievement test scores
Another important objective was to evaluate the impact of IBT on achievement scores of students in second language.

On the whole analysis of achievement test on pre-test data
Research Question: Is IBT methodology effective for the teaching of second language?
Independent sample t-test was used to compare overall mean scores of achievement test between experimental group and control group on pre-test data.

Table 1
Comparison of Students Overall Mean Scores of Achievement test in Experimental with that of Control Groups on Pre-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	57.92	6.84	0.957	48	0.343
Control group	25	56.00	7.33			

P>.05

The table 1 depicts that in pre-test the studentsmean score instructed through IBT (mean=57.92) was not significantly different (t=0.957, df=48, p=0.343) from the mean score of the students taught through lecture/traditional method (mean=56.00). According to the results it is concluded that in pre-test the achievement score of students in the achievement test of English for both the experimental group and the control group is the same.

On the whole analysis of achievement test on post-test data
Research Question: Is IBT methodology effective for the teaching of second language?
Independent sample t-test was used to compare mean scores of the achievement test between experimental group and control group on post-test data.

Table 2
Comparison of Students Overall Mean Scoresof Achievement Test in Experimental Group with that of Control Group on Post-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	66.36	5.879	5.615	48	0.000
Control group	25	57.36	5.445			

*P< .05

The table 2 depicts that in post-test the studentsmean score instructed through IBT (mean=66.36) was significantly greater (t=5.879, df=48, p=0.000) than studentsmean score instructed through lecture method (mean=57.36). According to the results it is concluded that the students' achievement score in experimental group was significantly greater than control group in post-test.

Analyses of the achievement test according to levels of cognitive domain
Analysis of knowledge level items of achievement test on pre-test data
Research Question: Does IBT have impact on students' knowledge level of cognitive domain?
Independent sample t-test was used to compare mean scores of achievement test at knowledge level between treatment group and control group on pre-test data.

Table 3
Comparison of Achievement Test Mean Scores at Knowledge Level Items between Experimental and control groups on Pre-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	6.240	2.087	0.000	48	1.000
Control group	25	6.240	1.984			

P> .05

The table 3 depicts that the students mean score instructed through IBTin pre-test (mean=13.280) was not significantly different (t=1.441, df=48, p=0.156) from the mean score of the students taught through lecture/traditional method (mean=12.200). According to the results it is concluded that in pre-test the achievement score of students at knowledge level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of knowledge level items of achievement test on post-test data
Research Question: Does IBT have impact on students' knowledge level of cognitive domain?
Independent sample t-test was used to compare mean scores of knowledge level of the achievement test between experimental group and control group on post-test data.

Table 4

Comparison of mean scores of Knowledge Level Items of Achievement Test Between Experimental and Control Groups on Post-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	24	17.720	2.937	1.130	48	0.264
Control group	25	16.880	2.278			

P> .05

The table 4 depicts that in post-test the mean score of the students taught through IBT (mean=17.720) was not significantly different (t=1.130, df=48, p=0.264) from the mean score of the students taught through lecture/traditional method (mean=16.880). According to the results it is concluded that in post-test the impact of IBT methodology on achievement scores of students at knowledge level in achievement test of English for both the experimental group and the control group is the same.

Analysis of achievement test at comprehension level items on pre-test data
Research Question: Does IBT have impact on students' comprehension level of cognitive domain?
Independent sample t-test was used to compare achievement test mean scores at comprehension level between treatment group and control group on pre-test data.

Table 5

Comparison of Mean Scores of Comprehension Level Items of Achievement Test between Treatment Group and Control Group on Pre-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	24	13.280	2.590	1.441	48	0.156
Control group	25	13.200	2.708			

P> .05

The table 5 depicts that the studentsmean scoreinstructed through IBTin pre-test (mean=13.280) was not significantly different (t=1.441, df=48, p=0.156) from the mean score of the students taught through lecture/traditional method (mean=13.200). According to the results it is concluded that in pre-test the achievement score of students at comprehension level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of achievement test at comprehension level items on post-test data.
Research Question: Does IBT have impact on students' comprehension level of cognitive domain?
Independent sample t-test was used to compare mean scores of achievement test at comprehension level betweentreatment group and control group on post-test data.

Table 6

Comparison of Mean Scores of comprehension level items of achievement test between treatment group and Control Group on Post-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	14.600	2.041	3.408	48	0.001
Control group	25	12.400	2.500			

*P< .05

The table 6 depicts that the students mean score instructed through IBT in post-test (mean=14.600) was significantly greater(t=3.408, df=48, p=0.001) than the students mean score instructed through lecture method (mean=12.400). According to the results it is concluded that in post-test the impact of IBT methodology on achievement students' scores at level of comprehension in achievement test of English for the treatment group is considerably greater than that of control group.

Analysis of achievement test at application level items on pre-test data

Research Question: Does IBT have impact on students' application level of cognitive domain?

Independent sample t-test was used to compare mean scores of achievement test at level of application between experimental group and control group on pre-test data.

Table 7

Comparison of Mean Scores of Application Level Items of achievement test between treatment group and Control Group on Pre-Test Data

Groups	*N*	*M*	*SD*	*t*	df	Sig.(2-tailed)
Experimental group	25	12.400	2.661	0.352	48	0.727
Control group	25	12.120	2.962			

P> .05

The table 7 depicts that the students mean score instructed through IBT in pre-test (mean=12.400) was not significantly different (t=0.352, df=48, p=0.727) from the mean score of the students taught through lecture/traditional method (mean=12.120). According to the results it is concluded that in pre-test the achievement score of students at application level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of achievement test at application level items on post-test data

Research Question: Does IBT have impact on students' application level of cognitive domain?

Independent sample t-test was used to compare mean scores of achievement test at application level between treatment group and control group on post-test data.

Table 8

Comparison of Mean Scores of Application Level Items of Achievement Test between Treatment Group and Control Group on Post-Test Data

Groups	*N*	*M*	*SD*	*t*	df	Sig.(2-tailed)
Experimental group	25	13.800	2.160	3.004	48	0.004
Control group	25	11.840	2.444			

*P< .05

The table 8 depicts that the studentsmean scoreinstructed through IBTin post-test (mean=13.800) was significantly greater(t=3.004, df=48, p=0.004) than the studentsmean scoreinstructed through lecture method (mean=11.840). According to the results it is concluded that in post-test the impact of IBT methodology on achievement score of students at application level in achievement test of English for the treatment group is considerably greater than that of control group.

Analysis of achievement test at analysis level items on pre-test data

Research Question: Does IBT have impact on students' analysis level of cognitive domain?

Independent sample t-test was used to compare mean scores of analysis level of achievement test between treatment group and control group on pre-test data.

Table 9

Comparison of Mean Scores of Analysis Level Items of Achievement Test Between Treatment Group and control group on Pre-Test Data

Groups	*N*	*M*	*SD*	*t*	df	Sig.(2-tailed)
Experimental group	25	3.720	1.307	-0.341	48	0.735
Control group	25	3.840	1.178			

P> .05

The table 9 depicts that the studentsmean scoreinstructed through IBTin pre-test (mean=3.720) was not significantly different (t=-0.341, df=48, p=0.735) from the mean score of the students taught through lecture/traditional method (mean=3.840). According to the results it is concluded that in pre-test the achievement score of students at analysis level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of achievement test at analysis level items on post-test data
Research Question: Does IBT have impact on students' analysis level of cognitive domain?
Independent sample t-test was used to compare mean scores of analysis level of achievement test betweentreatment group and control group on post-test data.

Table 10
Comparison of Mean Scores of Analysis Level Items of Achievement Test Between Treatment Group and Control Group on Post-Test Data

Groups	*N*	*M*	*SD*	*t*	df	Sig.(2-tailed)
Experimental group	25	4.280	1.307	3.300	48	0.002
Control group	25	3.240	0.879			

*P< .05

The table 10 depicts that the studentsmean scoreinstructed through IBTin post-test (mean=4.280) was significantly greater(t=3.300, df=48, p=0.002) than the studentsmean scoreinstructed through lecture method (mean=3.240). According to the results it is concluded that in post-test the impact of IBT methodology on achievement score of students at analysis level in achievement test of English for the experimental group is significantly greater than that of control group.

Analysis of achievement test at synthesis level items on pre-test data
Research Question: Does IBT have impact on students' synthesis level of cognitive domain?
Independent sample t-test was used to compare mean scores of synthesis level of achievement test betweentreatment group and control group on pre-test data.

Table 11
Comparison of mean scores of synthesis level items of achievement test between treatment group and control group on pre-test data

Groups	*N*	*M*	*SD*	*t*	df	Sig.(2-tailed)
Experimental group	25	6.240	2.087	0.000	48	1.000
Control group	25	6.240	1.984			

P> .05

The table 11 depicts that the studentsmean scoreinstructed through IBTin pre-test (mean=6.080) was not significantly different (t=1.072, df=48, p=0.289, α=0.05) from the mean score of the students taught through lecture/traditional method (mean=5.480). According to the results it is concluded that in pre-test the achievement score of students at synthesis level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of achievement test at synthesis level items on post-test data
Research Question: Does IBT have impact on students' synthesis level of cognitive domain?
Independent sample t-test was used to compare mean scores of synthesis level of achievement test between treatment group and control group on post-test data.

Table 12
Comparison of Mean Scores of Synthesis Level Items of Achievement Test Between Treatment Group and Control Group on Post-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	6.240	2.087	0.000	48	1.000
Control group	25	6.240	1.984			

P> .05

The table 12 depicts that the studentsmean scoreinstructed through IBTin post-test (mean=6.240) was not significantly different (t=0.000, df=48, p=1.000) from the mean score of the students taught through lecture/traditional method (mean=6.240). According to the results it is concluded that in post-test the impact of IBT methodology on achievement score of students at synthesis level in achievement test of English for both the experimental group and the control group is the same.

Analysis of evaluation level items of achievement test on pre-test data
Research Question: Does IBT have impact on students' evaluation level of cognitive domain?
Independent sample t-test was used to compare mean scores of evaluation level of achievement test between treatment group and control group on pre-test data.

Table 13
Comparison of Mean Scores of Evaluation Level Items of Achievement Test Between Treatment Group and Control Group on Pre-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	6.560	1.757	1.148	48	0.257
Control group	25	6.040	1.428			

P> .05

The table 13 depicts the studentsmean scoreinstructed through IBTin pre-test (mean=6.560) was not significantly different (t=1.148, df=48, p=0.257) from the mean score of the students taught through lecture/traditional method (mean=6.040). According to the results it is concluded that in pre-test the achievement score of students at evaluation level in the achievement test of English for both the experimental group and the control group is the same.

Analysis of evaluation level items of achievement test on post-test data
Research Question: Does IBT have impact on students' evaluation level of cognitive domain?
Independent sample t-test was used to compare mean scores of evaluation level of achievement test betweencontrol group and treatment group on post-test data.

Table 14
Comparison of Mean Score of Evaluation Level Items of Achievement Test Between Treatment Group and Control Group on Post-Test Data

Groups	N	M	SD	t	df	Sig.(2-tailed)
Experimental group	25	9.720	1.275	6.630	48	0.000
Control group	25	6.760	1.832			

*P< .05

The table 14 depicts that the studentsmean scoreinstructed through IBTin post-test (mean=9.720) was significantly greater (t=6.630, df=48, p=0.000) than the students mean score instructed through lecture method (mean=6.760). According to the results it is concluded that in post-test the impact of IBT

methodology on achievement score of students at evaluation level in achievement test of English for the treatment group is considerably greater than that of control group.

Findings Related to the Impact of IBT on Achievement Scores in the Achievement Test of Students in Second Language

1. Overall comparison of achievement scores show that the students instructed through IBT had considerably greater (t=5.879, df=48, p=0.000) mean score (mean=66.36) than taught through lecture method (mean=57.36).
2. At level of knowledge of cognitive domain, the students instructed through IBT had not significantly different (t=1.130, df=48, p=0.264) mean score (mean=17.720) fromthe students taught through lecture method (mean=16.880).
3. At level of comprehension of cognitive domain, the students instructed through IBT had significantly greater (t=3.408, df=48, p=0.001) mean score (mean=14.600) than taught through lecture method (mean=12.400).
4. At level of application of cognitive domain, the students instructed through IBT had significantly greater (t=3.004, df=48, p=0.004) mean score (mean=13.800) than taught through lecture method (mean=11.840).
5. At level of analysis of cognitive domain, the students instructed through IBT had significantly greater (t=3.300, df=48, p=0.002) mean score (4.280) than taught through lecture method (mean=3.240).
6. At level of synthesis of cognitive domain, the students instructed through IBT had not significantly different (t=0.000, df=48, p=1.000) mean score (mean=6.240) from the studentsinstructed through lecture method (mean=6.240).
7. At level of evaluation of cognitive domain, the students instructed through IBT had significantly greater (t=6.630, df=48, p=0.000) mean score (mean=9.720) than taught through lecture method (mean=6.760).

Conclusions Related to the Impact of IBT on Students' Academic Achievement in Second Language

1. The use of inquiry based teaching (IBT) methodology in the teaching of English as a second language improves the performance of students in grammar of the language.
2. Inquiry based teaching (IBT) significantly improves students' performance in the ESL at comprehension, application, analysis, and evaluation levels of cognitive domain.
3. Using inquiry based teaching (IBT) has no impact on students' performance in ESL at knowledge and synthesis levels of cognitive domain.

Discussion

The study concludes that inquiry based teaching (IBT) improves students' academic performance in grammatical concepts of English at comprehension, application, analysis and evaluation of cognitive domain. The results are supported by the work of McWhorter and Hudson-Ross (1996) reporting that without appropriate methodologies of instruction students' performance in education remains poor. The instructional technique is helpful in enhancing educational achievement of students (Damodharan & Rengarajan, 1999).It is reported thatIBT stimulates and develops learners' advanced level of cognitive domain by their linguistic and cognitive involvement and instead of cramming facts; vigilantly structured questions make them able to link, relate, investigate and synthesize (Lee, 2014). The study shows that inquiry based teaching (IBT) does not have any significant impact on knowledge level of cognitive domain; it might be due to the reason that the lowest level of cognitive domain is knowledge level whereas IBT develops higher levels of cognitive domain in students. Moreover IBT does not have any significant impact on the synthesis level of cognitive domain; it might be due to the reason that open-ended questions were not included in the achievement test of the study.

Recommendations

Recommendations for further researches:

1. The study should be extended to primary level to discover the impacts of IBT methodology on young students.
2. For further research, structured interviews should be employed to explore responses of students instead of using questionnaires because they are difficult for young students to comprehend and respond.
3. To control novelty impact of teacher, subject teachers of experimental class and control class who are already teaching foreign language to the classes should teach during experimentation as well. They should be trained first according to the need of the experiment before conducting the experiment.
4. Duration of experiment should be extended to get clearer results of the study.
5. Further research should be conducted to discover the suitability of IBT for the teaching of other social sciences.

Recommendations for Stakeholders of Education

1. Teacher trainers should train teachers to employ IBT methodology in the instruction of English as second language.
2. Language teachers should implement IBT to plan and teach second language in L2 class to find out its impacts on students' learning of the language.
3. Content developers should develop the content for language teaching that can facilitate the language teachers to implement IBT in L2 class.
4. The school administration should empower and facilitate language instructors to use IBT in L2 class.

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