

Investigating ILI Advanced Students' Critical Thinking by Teachers' Questions: with the Emphasis on Bloom's Revised Taxonomy

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ABSTRACT: This study investigated the Iran Language Institute (ILI) advanced students' critical thinking by teachers' questions based on six cognitive skills (i.e., remembering, understanding, applying, analyzing, evaluating and creating) of Bloom's Revised Taxonomy (BRT) in Qazvin and Karaj. A 63-question type checklist based on BRT was used to see to what extent the ILI Advanced teachers apply critical thinking questions during the class. Besides, a 75-item questionnaire of California Critical Thinking Disposition Inventory (CCDI) which was based on a six-point Likert-type Scale was used to assess 138 Students' CT. The results showed that the teachers' focus on the sub-categories of cognitive skills in Qazvin and Karaj were not much far from each other and the lower-order cognitive skills (i.e., remembering, understanding and applying) were relatively more than the higher-order ones (i.e., analyzing, evaluating and creating). In addition, the students' critical thinking was not different among Advanced 1, 2, and 3 in ILI. Finally the ILI advanced teachers in the chosen branches did not use a lot of higher-order questions in their teaching procedure.

Key words: ILI advanced students, critical thinking, teacher's questions, Bloom's Revised Taxonomy

ORIGINAL ARTICLE

INTRODUCTION

It's time to concentrate on critical thinking and swing from rote learning to prepare students as critical thinkers. Since critical thinking is an indispensable part of teaching every subject especially when the students go to higher levels of education so it is important for learners to master it. In fact, good thinking is driven by good questions rather than correct responses. The quality of teachers' questions determines the quality of students' critical thinking. One of the essential skills of good thinking would be the art of asking questions (Khan & Inamullah, 2011). A good question is needed to inspire students' motivation, focus their attention and help students think better (Dillon, 1998).

In former studies, the majority of researchers investigated teachers' questioning manners in the classroom and presented costly results for language teaching and learning (Zhou & Zhou, 2002; Hu, 2004; David, 2007) but a few research studies have examined the influence of teacher's questioning and students' critical thinking in the classroom. For example, classroom teachers manage to promote students' critical thinking through applying cooperative learning (Cooper, 1995), focusing on adding questioning techniques into class discussions to support an educational atmosphere where students can practice critical thinking skills (Brown & Kelley, 1986; Hemming, 2000), putting emphasis on the significance of asking the accurate questions to stimulate students' critical thinking skills (Haynes and Bailey, 2003), using Socratic questioning (Yang, Newby & Bill, 2005) and employing written and audiotaped dialogue journals (Khatib, Marefat & Ahmadi, 2012), discussing the point of view in literature in EFL classes (Tung & Chang, 2009; Khatib & Nazari, 2012).

Types of classroom questions

The level of students' thinking is strongly influenced by the level of questions which are asked in class (King, 1995 and Taba, 1966). Celce-Murcia and Larsen-Freeman (1999), classified questions into four kinds, yes/no questions are mainly used to look for new information or clarify or confirm given or shared information. In contrast, wh-questions are used to extract particular kinds of information. As for the tag questions and alternative questions, they are not used to seek information. The Question Category System for Science (QCSS) (Blosser, 1973) classified the questions as being one of four major types which are presented in the following chart. Schafersman (1991) suggested two methods for teaching critical thinking. The first method is to change one's teaching and testing methods to some extent to improve critical thinking among one's students. This can be occurred through lectures, laboratories, homework, quantitative exercises, term papers and exams. The second method makes use of formal critical thinking exercises, programs, and materials that have been made by specialists and can be bought for instant use by the teacher. Richard & Lockhart (1996) classified questions into three categories: Procedural questions deal with classroom procedures and routines, and classroom

engagement. Convergent questions support similar student responses. They often focus on the recall of previously presented information. Divergent questions encourage students to give their own information rather than to recall previously existing information. Moreover, Halpern, (2003) believed that when thinking skills are explicitly taught the students can learn to develop how they think. So that a Four-Part Model for explicit teaching of critical thinking is planned which are as follows: **Part one- Dispositions for critical thinking:** Explains that it will be helpful to teach college students the skills of critical thinking, if they want to use them; **Part two- Instruction in the skills:** Critical thinking skills are to be instructed; **Part three- Structure training:** It is a way of improving the possibility that students will distinguish when a particular thinking skill is needed, even in a new context. Part four: Metacognitive monitoring. Metacognition is usually defined as what we know about what we know. So metacognitive monitoring is determining how we can use the knowledge we already possess to direct and improve the thinking and learning processes.

| Question Type | Question Function |
|---------------|---|
| Managerial | To keep the classroom operations moving |
| Rhetorical | To emphasize a point, to reinforce an idea or statement |
| Closed | To check the retention of previously learned information, to focus thinking on a particular point or commonly-held set of ideas |
| Open | To promote discussion or student interaction; To stimulate student thinking; to allow freedom to hypothesize, speculate, share ideas about possible activities, etc. |

Bloom's Revised Taxonomy questions

One of the most widely used resources for cognitive question types is Bloom's taxonomy which describes the objectives relating to knowledge, intellectual abilities and skills. It describes six categories - knowledge, comprehension, application, analysis, synthesis and evaluation (Bloom 1956; Hunkins 1972; Woolfolk 1984).

Knowledge questions: require students to recall the information as it was learnt. **Comprehension questions:** require students to indicate understanding of the material. **Application questions:** students need to solve problems for particular information.

Analysis questions: require students to think critically, identify reasons, motives and make inference based on given information.

Synthesis questions: require students to put together elements and parts so as to form a whole. **Evaluative questions:** making judgments and offering an opinion to evaluate a product or idea. In other words, Bloom's taxonomy is divided into two types of questions: lower order and higher order questions. Lower order questions require students to involve knowledge, comprehension and application while higher order questions include analysis, synthesis and evaluation (Yang, 2010). Anderson & Krathwohl (2001) revised Bloom's taxonomy to better fit educational practices of the 21st century:

- **Remembering questions:** Providing verbal or written texts about the subject that can be answered by recalling the information the student has learned.
- **Understanding questions:** Organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas in own words.
- **Applying questions:** Solving problems to new situations by using acquired knowledge, facts, techniques and rules in a different way.
- **Analyzing questions:** Breaking down a concept or idea and showing the relationship among the parts.
- **Evaluating questions:** Making judgments about information, validity of ideas, or quality of work based on a set of criteria.
- **Creating questions:** Combining information together in a different way or in a new pattern to propose alternative solutions.

Based on the above literature and gap this study intended to find answer for following questions:

1. Do the ILI Advanced teachers use questions to improve students' critical thinking based on Bloom's Revised Taxonomy?
2. Are there any differences among students' critical thinking of Qazvin and Karaj?

METHODOLOGY

Participants

A total number of 138 language learners at advanced level in Qazvin and Karaj of Iran language Institutes were selected to participate in this study. Their ages ranged from 15 to 42.

Instrumentation

Two research instruments were used for data collection in this study. The first one, used for identifying students' critical thinking, was a 75 questionnaire based on California Critical Thinking Disposition Inventory (CCTDI) and the second one was Bloom's checklist with 63 questions to investigate the frequency of critical thinking questions during the class.

RESULTS AND DISCUSSION

Research hypothesis 1: One-way Repeated Measure ANOVA was performed. Before discussing the results of this analysis, the descriptive statistics of the teachers' focus on the sub categories of cognitive skills in Qazvin and Karaj Branches were calculated and provided in Table 1. As can be seen in the table, the means of sub categories of cognitive skills are not much far from each other though the means of the most lower-order skills of 'Remembering', 'Understanding' and 'Applying' are to relatively more than the most higher-order cognitive skills of 'Analyzing', 'Evaluating' and 'Creating'.

The results of this analysis are represented in Tables. Homogeneity of variance is the main assumption of this analysis. As it is obvious in Table 2, the homogeneity of variance was met for all six sub categories of cognitive skills since the Sig. of Levene's test was less than .05 for all of them. The results of Repeated Measures ANOVA as appeared in Table 3.3 below indicated that the effect of within-subject factor, i.e., cognitive skill type was significant, since the value for Wilks' Lambda is .212 ($F_{(5, 8)} = 5.95; p = .014, p < .05$). In addition the results showed that the interaction effect between within-subject and between-subject factors, i.e., cognitive skill type - branch was not significant ($F_{(5, 8)} = .621; p = .68, p > .05$).

Moreover, Tests of Between-Subjects Effects as shown in Table 4 below revealed that the impact of between-subject factor, i.e., branch was not significant ($F = .059, p = .813, p > .05$).

Although we have found a statistically significant difference between the six sets of scores, we still do not know the exact location of the difference between them. Therefore this information is provided in the Pairwise Comparisons (Table 1), which compares each pair of sentence types and indicates whether the difference between them is significant or not. Post-hoc comparison ANOVA (see Table 5) indicated that there were not significant differences among most Higher-order cognitive skills of 'Analyzing', 'Evaluating' 'Creating' and the lower-order skills of 'Remembering', 'Understanding' and 'Applying' ($p > .05$). In fact the mean scores obtained on most higher-order skills were less than the lower-order one. Thus the fifth null hypothesis that stated "The ILI Advanced teachers do not use questions to improve students' critical thinking based on Bloom's Revised Taxonomy" was retained, and it was asserted that the ILI Advanced teachers do not use questions to improve students' Critical Thinking based on Bloom's Revised Taxonomy.

Table 1. Descriptive Statistics for Sub Categories of Cognitive Skills in Qazvin and Karaj Institutes

| Cognitive skill types | Branch | Mean | Std. Deviation | N |
|-----------------------|--------|--------|----------------|----|
| Remembering | Qazvin | 3.8444 | 1.00185 | 5 |
| | Karaj | 4.0741 | .81271 | 9 |
| | Total | 3.9921 | .85342 | 14 |
| Understanding | Qazvin | 4.1333 | .99194 | 5 |
| | Karaj | 4.1728 | .80145 | 9 |
| | Total | 4.1587 | .83571 | 14 |
| Applying | Qazvin | 3.4833 | 1.02130 | 5 |
| | Karaj | 3.1111 | .92421 | 9 |
| | Total | 3.2440 | .93853 | 14 |
| Analyzing | Qazvin | 3.5455 | .83567 | 5 |
| | Karaj | 3.4747 | .79614 | 9 |
| | Total | 3.5000 | .77857 | 14 |
| Evaluating | Qazvin | 3.5000 | .85999 | 5 |
| | Karaj | 3.2963 | .70847 | 9 |
| | Total | 3.3690 | .73939 | 14 |
| Creating | Qazvin | 3.4800 | .97570 | 5 |
| | Karaj | 3.2556 | .66542 | 9 |
| | Total | 3.3357 | .76017 | 14 |

Table 2. Learner's Test of Equality of Error Variances

| Cognitive skill types | F | df1 | df2 | Sig. |
|-----------------------|------|-----|-----|------|
| Remembering | .096 | 1 | 12 | .762 |
| Understanding | .148 | 1 | 12 | .707 |
| Applying | .292 | 1 | 12 | .599 |
| Analyzing | .227 | 1 | 12 | .642 |
| Evaluating | .229 | 1 | 12 | .641 |
| Creating | .234 | 1 | 12 | .637 |

Table 3. Repeated Measures ANOVA (Multivariate Tests)

| Effect | | Value | F | Hypothesis df | Error df | Sig. | Partial Eta Squared |
|------------------------|--------------------|-------|-------|---------------|----------|------|---------------------|
| Branch | Pillai's Trace | .788 | 5.953 | 5.000 | 8.000 | .014 | .788 |
| | Wilks' Lambda | .212 | 5.953 | 5.000 | 8.000 | .014 | .788 |
| | Hotelling's Trace | 3.721 | 5.953 | 5.000 | 8.000 | .014 | .788 |
| | Roy's Largest Root | 3.721 | 5.953 | 5.000 | 8.000 | .014 | .788 |
| Question type * branch | Pillai's Trace | .280 | .621 | 5.000 | 8.000 | .689 | .280 |
| | Wilks' Lambda | .720 | .621 | 5.000 | 8.000 | .689 | .280 |
| | Hotelling's Trace | .388 | .621 | 5.000 | 8.000 | .689 | .280 |
| | Roy's Largest Root | .388 | .621 | 5.000 | 8.000 | .689 | .280 |

Table 4. Tests of Between-Subjects Effects

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|-----------|-------------------------|----|-------------|---------|------|---------------------|
| Intercept | 1007.711 | 1 | 1007.711 | 304.011 | .000 | .962 |
| Branch | .194 | 1 | .194 | .059 | .813 | .005 |
| Error | 39.777 | 12 | 3.315 | | | |

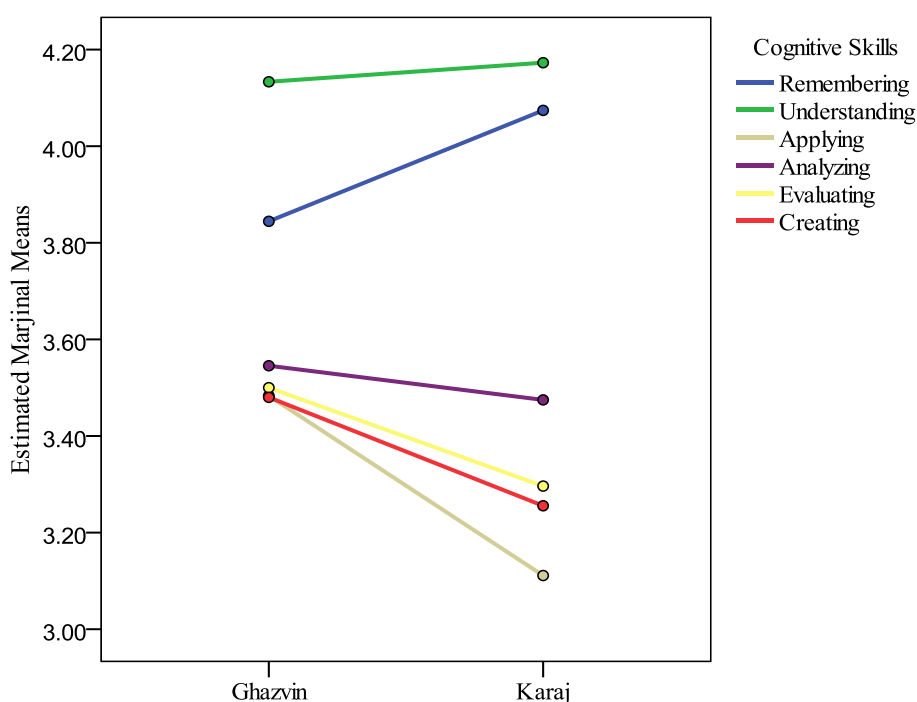


Figure 1. Sub categories of cognitive skills in Qazvin and Karaj branch universities

Research hypothesis 2: One-way Repeated Measure ANOVA was conducted to answer this research question. The descriptive statistics of the students' focus on the sub categories of cognitive skills in Qazvin and Karaj Branches were calculated and provided in Table 6. The table shows that the means of students' critical thinking are not much different among ILI Advanced Book 1 ($M = 3.90, SD = .28$), Book 2 ($M = 3.89, SD = .28$) and Book 3 ($M = 3.86, SD = .34$). Besides, the critical thinking means of the students of Qazvin are not far from those in Karaj Branch in ILI Advanced Series.

As Table 7 shows, the homogeneity of variance was met because the Sig. of Levene's test, .55 was greater than .05.

The results of Two-Way ANOVA as shown in Table 8 below revealed that the effect of level of ILI Advanced Series was not significant ($F_{(2)} = .128; p = .88, p > .05$, Effect size = .002). In addition the results indicated that the effect of branch was not significant ($F_{(1)} = .417; p = .51, p > .05$, Effect size = .003). However ANOVA results showed that the interaction effect of level - branch was significant ($F_{(1)} = 5.951; p = .01, p < .05$, Effect size = .04); consequently the sixth null hypothesis as "There are any significant differences among ILI Advanced students' critical thinking in Karaj and Qazvin" was retained, and therefore it was concluded that there are not any significant differences among ILI Advanced students' critical thinking in Karaj and Qazvin. The graphical representation of the results is shown in Figure 6.

Table 5. Post-Hoc Comparisons for Sub Categories of Cognitive Skills in Qazvin and Karaj Institutes

| (I) factor1 | (J) factor1 | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval for Difference | |
|---------------|---------------|-----------------------|------------|-------|--|-------------|
| | | | | | Lower Bound | Upper Bound |
| Remembering | Understanding | -.167 | .137 | 1.000 | -.658 | .325 |
| | Applying | .748* | .187 | .022 | .079 | 1.417 |
| | Analyzing | .492* | .137 | .049 | .001 | .983 |
| | Evaluating | .623* | .134 | .007 | .143 | 1.103 |
| | Creating | .656 | .213 | .133 | -.108 | 1.421 |
| Understanding | Remembering | .167 | .137 | 1.000 | -.325 | .658 |
| | Applying | .915* | .191 | .005 | .230 | 1.599 |
| | Analyzing | .659* | .132 | .004 | .185 | 1.133 |
| | Evaluating | .790* | .154 | .003 | .237 | 1.342 |
| | Creating | .823 | .234 | .056 | -.014 | 1.660 |
| Applying | Remembering | -.748* | .187 | .022 | -1.417 | -.079 |
| | Understanding | -.915* | .191 | .005 | -1.599 | -.230 |
| | Analyzing | -.256 | .142 | 1.000 | -.764 | .252 |
| | Evaluating | -.125 | .166 | 1.000 | -.720 | .470 |
| | Creating | -.092 | .186 | 1.000 | -.759 | .575 |
| Analyzing | Remembering | -.492* | .137 | .049 | -.983 | .000 |
| | Understanding | -.659* | .132 | .004 | -1.133 | -.185 |
| | Applying | .256 | .142 | 1.000 | -.252 | .764 |
| | Evaluating | .131 | .121 | 1.000 | -.302 | .564 |
| | Creating | .164 | .169 | 1.000 | -.441 | .769 |
| Evaluating | Remembering | -.623* | .134 | .007 | -1.103 | -.143 |
| | Understanding | -.790* | .154 | .003 | -1.342 | -.237 |
| | Applying | .125 | .166 | 1.000 | -.470 | .720 |
| | Analyzing | -.131 | .121 | 1.000 | -.564 | .302 |
| | Creating | .033 | .139 | 1.000 | -.465 | .532 |
| Creating | Remembering | -.656 | .213 | .133 | -1.421 | .108 |
| | Understanding | -.823 | .234 | .056 | -1.660 | .014 |
| | Applying | .092 | .186 | 1.000 | -.575 | .759 |
| | Analyzing | -.164 | .169 | 1.000 | -.769 | .441 |
| | Evaluating | -.033 | .139 | 1.000 | -.532 | .465 |

Table 6. Descriptive Statistics for Students' Critical Thinking in ILI Advanced Series in Qazvin and Karaj

| Level | Branch | Mean | Std. Deviation | N |
|-------|---------|--------|----------------|-----|
| Ad1 | Qazvin | 3.8646 | .30119 | 32 |
| | Karaj | 3.9646 | .25865 | 26 |
| | Total | 3.9094 | .28495 | 58 |
| Ad2 | Qazvin | 3.9965 | .25989 | 23 |
| | Karaj | 3.8244 | .27903 | 30 |
| | Total | 3.8991 | .28180 | 53 |
| Ad3 | Karaj | 3.8602 | .34334 | 27 |
| | Total | 3.8602 | .34334 | 27 |
| Total | Ghazvin | 3.9198 | .28967 | 55 |
| | Karaj | 3.8800 | .29806 | 83 |
| | Total | 3.8958 | .29433 | 138 |

Table 7. Levene's Test of Equality of Error Variances

| F | df1 | df2 | Sig. |
|------|-----|-----|------|
| .762 | 4 | 133 | .552 |

Table 8. Two-Way ANOVA to Compare the Effects of Book Level and Institute Branch

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|-----------------|-------------------------|-----|-------------|-----------|------|---------------------|
| Corrected Model | .575 | 4 | .144 | 1.691 | .156 | .048 |
| Intercept | 1947.600 | 1 | 1947.600 | 22936.453 | .000 | .994 |
| Level | .022 | 2 | .011 | .128 | .880 | .002 |
| Branch | .035 | 1 | .035 | .417 | .519 | .003 |
| Level * Branch | .505 | 1 | .505 | 5.951 | .016 | .043 |
| Error | 11.293 | 133 | .085 | | | |
| Total | 2106.378 | 138 | | | | |
| Corrected Total | 11.868 | 137 | | | | |

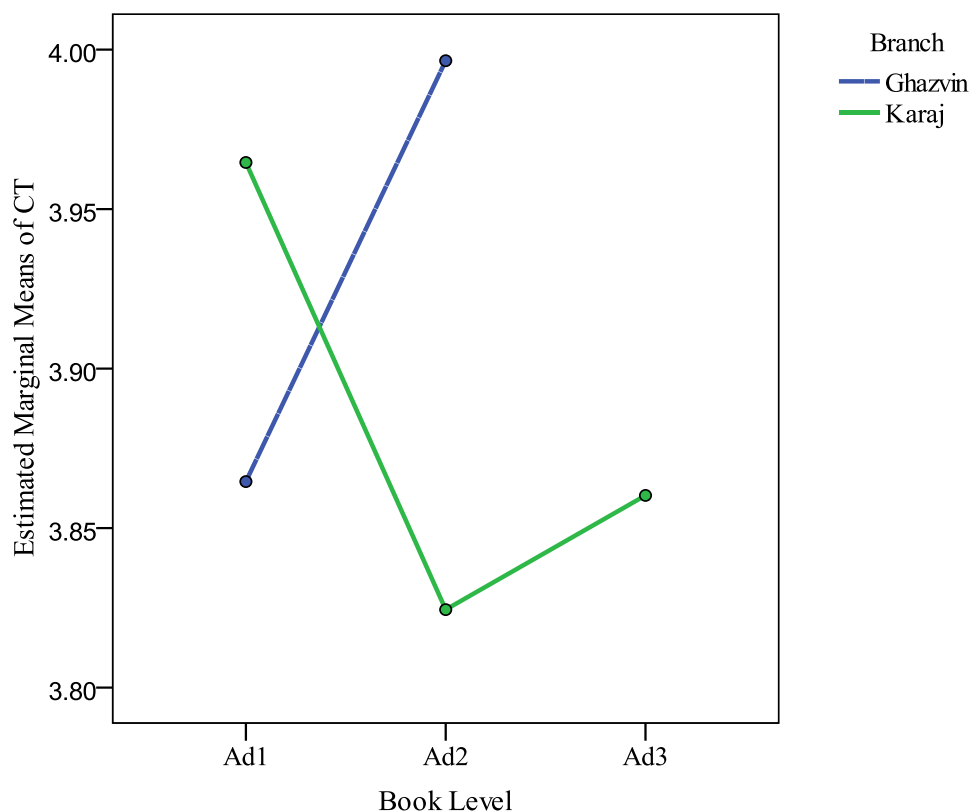


Figure 6. Students' critical thinking in Qazvin and Karaj ILI Branches

CONCLUSION

Teacher questioning is considered as one of the important activities in EFL classroom and the most important thing is higher order questions to improve students' critical thinking because in this way the students can engage in activities such as analyzing, evaluating and creating. Since the present study investigated the advanced students, it was assumed that the teachers would ask mostly higher order questions but the results were in contrast with the assumption. The findings supported the earlier studies that the English teachers use only 20 to 30 percent higher level questions (Haynes, 1935; Corey, 1940). Another study in United States and England indicated that from five questions which were asked by the classroom teachers, only one was higher order question (Dillon, 1988). Moreover, investigating the students' critical thinking in Karaj and Qazvin indicated that although ILI students were in different levels of advanced, there weren't any significant differences among them.

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