



## **Homogenous vs. Heterogeneous Collaborative Learning: A Case in Problem-Based Language Learning**

**Fahimeh Farahani**

*Tehran University of Medical Sciences, Iran*

**Hanieh Kashi**

*Islamic Azad University, Qeshm Branch, Qeshm, Iran*

**Paria Isazadeh**

*Tabriz Payame Noor University, I.R. of Iran*

### **Introduction**

Collaboration is one of the key terms in language learning and has been advocated by many scholars in the field with regard to the writing skill (Storch, 2005), mobile-assisted language learning (MALL) (Kukulska-Hulme & Shield, 2008), the speaking skill (Moussu & Llurda, 2008) and in other disciplines as well (Carr, 2001). Based on Vygotsky's Social Cognitive Theory (SCT), collaboration allows the learners to co-construct meanings and concepts and benefit from other learners' proximal zone to complete their knowledge about a subject (Vygotsky, 1978). From the psychological perspective, it has also been observed that collaboration motivates the language learners to accomplish language tasks (Dörnyei, 1997).

Although extensive research has been conducted with regard to collaboration, in many cases, it has simply been viewed as group work and the nature of collaboration has been ignored (Storch, 2005). In other words, collaboration has been viewed as a product and a closer look at its processes and dynamics with regard to language learners in particular contexts which undergo certain language teaching methods is required. For some language teaching methods which have been around for a number of years such as task-based language teaching (TBLT), collaboration has been subject to considerable research (Willis & Willis, 2013); however, for some newly arrived language teaching and learning methods, collaboration has not been subject to adequate research. In the case of problem-based language learning (PBL), for example, in which collaboration is a main component of learning, a detailed look at this issue is required (Ansarian & Teoh, 2018). Unlike many conventional language classes in which homogenous learners sit to learn the language, PBL advocates the formation of heterogeneous groups in which learners with varying degrees of knowledge, and critical reasoning abilities form the groups (Dolmans, De Grave, Wolfhagen, & Van Der Vleuten, 2005). However, the effectiveness of problem-based groups with heterogeneous learners compared to those with homogeneous learners is understudied; therefore, a number of questions with regard to this issue are still open. For example, whether or not the views of the

learners with low-cognitive level and high cognitive level with regard to collaboration in PBL groups are identical, or whether or not the effect of PBL tutorship in both homogenous and heterogeneous groups is similar. Such areas for research encouraged the researchers to design a mixed methods study and to investigate these two issues. The findings of this study can be used by language teachers and educational systems which are using or are thinking about using PBL.

## Research Questions

- Q1: How do the effects of PBL tutorship differ among heterogeneous groups and homogenous groups?
- Q2: How are the views of the learners with lower cognitive levels different from learners with higher cognitive levels in PBL tutorship?

## Review of the Literature

Based on the SCT, social context plays a significant role in the construction of meaning in the minds of the individuals. The main precursor of the theory in the 1960s was Bandura (Nabi & Clark, 2008) who had discussed this issue in Social Learning Theory (SLT). Through SLT Bandura posited that learning occurs in a social context and by dynamics and reciprocal interactions between people, the environment and behavior. Later in 1986, and based on SLT, emphasis was put on the social impact of learning in groups (Rotter, 1982). SCT focused on the approaches through which people maintain behavior by considering the social environment. In this theory, an individual's experiences play a role in their current actions and their future expectations (Bandura, 2001). Collaboration, therefore, is in line with SCT and has been considered as a learning feature in many language teaching methods such as TBLT and Communicative Language Learning (CLL).

A recent learning approach which considers collaboration a pillar in learning is problem-based language learning. Wee and Kek (2002) remark that problem-based learning is an experiential approach to learning which was used in apprenticeship for the first time. Learning from masters in any craft required the young apprentices to witness the act, perform the act, and receive feedback on their own performance. This process should have continued until they could stand on their own feet and run the business. This form of collaboration between a master and apprentice formed the basis of collaboration in problem-based learning to the extent that modern precursors of the approach also advocate the presence of senior learners in PBL groups (Savery, 2006), and the active role of the tutor in each and every PBL group in the class (Ansarian, Adlipour, Saber, & Shafiei, 2016).

The idea of a senior learner in PBL groups; however, is not in line with the idea of many language educators who homogenize their learners through language placement tests in particular classes. While some scholars in the field, e.g., Zhang (2010) supported the idea of heterogeneous learning; believing that it creates a better learning environment, other scholars have observed that, in practice the heterogeneity of the learners causes additional problems, makes learning and teaching more complicated, and might demotivate the learners (Millrood, 2002). Gatehouse (2001) also states that heterogeneity of the language learners in terms of their backgrounds and education is to some extent acceptable but can cause problems if it exceeds certain limits. Such debates about homogenous vs. heterogeneous learners can come to better conclusions through conducting more empirical studies on this issue. As a result, this study was conducted.

## Conceptual Framework

This study was an attempt to explore the views of language learners with varying degrees of cognitive level in PBL collaborative groups. The researchers felt the need for such a study, as the research dealing

with this issue is rare, and the effect of uncertainty towards this issue is obvious among PBL practitioners. To solve the problem, the researchers focused on collaboration and cognition as two inseparable characteristics of PBL and used a valid PBL model designed by Ansarian and Teoh (2018).

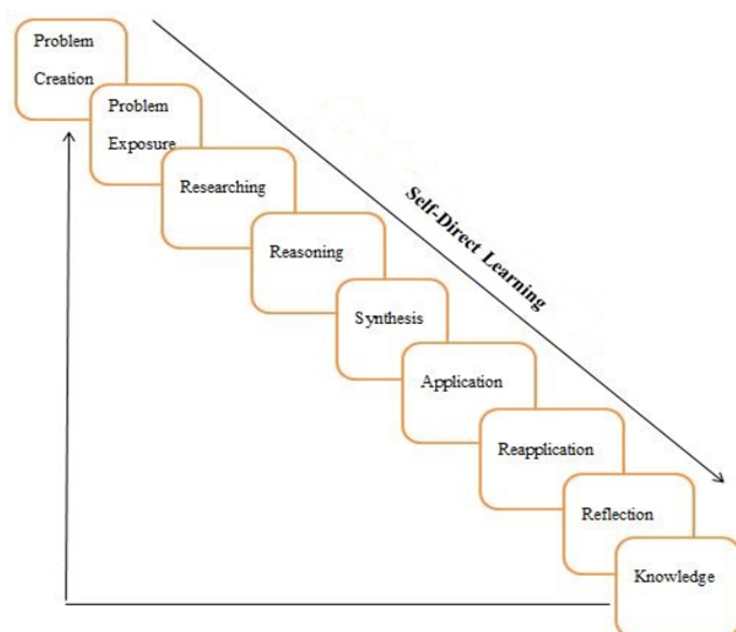


Figure 1. PBL model designed by Ansarian and Teoh (2018).

The model used in this study guides the learners through higher order thinking. It begins with the presentation of an unsystematic problem to the learner by the tutors and continues as the learners attempt to decode and analyze the problem and search for data to create a conversation which can solve the problem. Having selected the content and designed the conversation, the learner roleplays the conversation for other peers in the class and receives feedback from the peers and the teacher.

## Method

### Participants

The participants for this mixed-methods study were selected non-randomly through convenience sampling at a language institute in Tehran, Iran. These participants were both male ( $n = 31$ ) and female ( $n = 43$ ). All participants had at least 2 years of experience in language learning and were aged between 19 and 31. Among the participants who formed experimental group I and experimental group II, 6 respondents with a higher cognitive level and 7 respondents with a lower cognitive level from the experimental group II were interviewed.

### Instruments

Three main instruments were used in this study. At the outset of the study, the Oxford Placement Test (OPT) was administered to the participants as a placement test. Although these participants were studying at the pre-advanced level in the institute, the researchers wanted to make sure they differed only in terms of cognitive level; thus, homogenous language learners in terms of language proficiency were selected.

The second instrument was a cognitive-level questionnaire designed by the researcher based on Jonassen's (2002) explanation of various cognitive abilities among learners. Thirty questions were

administered to the learners and they were asked to provide short answers to the questions. The questions were of different types and began with less cognitive types of questions, i.e., algorithmic problems, story problems, and rule using, to more complicated questions such as dilemmas and decision problems. Based on Polit and Beck's (2006) definition of content validity, the questions were validated by 4 experts in the field in terms of item content validity index (I-CVI). Each item on the test was evaluated by experts in terms of their relevance, consistency, representativeness, and clarity of wording. Kappa was also calculated for each item of the test and was found to be between .75 and 1.00.

A semi-structured interview was conducted with the participants twice throughout the study. The interview consisted of 7 questions. The questions were also validated by 5 experts in the field and Cohen's Kappa was calculated for the semi-structured interview questions (between .83 and 1.00).

## Procedure

A total of 98 language learners who accepted to take part in this study were given a language placement test (OPT). Based on the results, 80 participants who fell into the pre-advanced level (level 5 out of 6) were selected. A Cognitive load test was administered to these participants. The researcher opted for 12 participants who significantly outperformed the other participants and assigned them as seniors in the PBL groups in experimental group I; however, the participants in experimental group I were selected homogeneously in terms of their cognitive level. Both groups experienced a PBL language course for 21 sessions (one complete semester). In sessions 9 and 20 the respondents from experimental group II were interviewed. To implement PBL in the experimental groups, the researchers used the procedure suggested by Ansarian and Teoh (2018). Their model clarifies each step of the PBL process and has explained the duties of both learners and tutors at each step. The researchers did not use textbooks to conduct the classes, as predetermined data is not in line with the main objectives of PBL. Instead, an online search was advocated to the participants to find relevant information. The researchers also presented problem-based language learning scenarios based on which the participants could search for data.

Later, the respondents' speech in the semi-structured interviews was recorded and transcribed. Next, the researchers extracted the main themes from the participants' speech. These themes were collected and sent back to the respondents to make sure the extracted themes were exactly what the respondents meant (member checking). Having made sure that the results were reliable, they were used in the qualitative analysis of data. In order to find the answer to the first research question, the researcher compared the posttest results of experimental group I and experimental group II. The posttest was a summative test designed by the Research and Development (R & D) section of the language institute as a final semester exam. The test consisted of 25 vocabulary and 25 grammatical questions.

## Results

The OPT test was given to the initial population prior to data collection. Figure 1 reveals the distribution of the scores on the OPT test. Considering the results of the OPT placement test given to the participants at the upper intermediate level, the researcher selected 42 participants whose scores fell in the range of upper intermediate on the OPT test. Next these participants were divided into two experimental groups which did not differ significantly in terms of overall language knowledge. To do so, an independent samples t-test was run with the results of the selected participants ( $n = 42$ ) on the OPT test. As observed in Table 1, the experimental group I mean ( $M = 83.61$ ,  $SD = 2.81$ ) is very close to the experimental group II ( $M = 83.95$ ,  $SD = 2.72$ ).

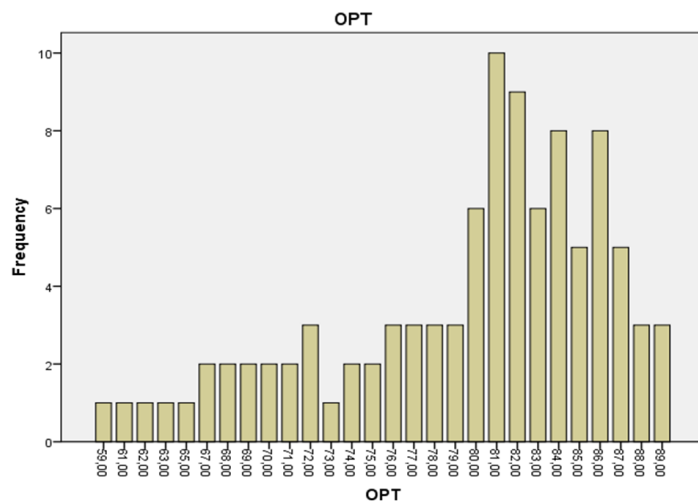


Figure 1. Frequency of distribution of the scores on OPT test.

TABLE 1

Descriptive Statistics: Experimental Group 1 vs. Experimental Group 2

Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental I	21	83.61	2.81	.615
Experimental II	21	83.95	2.72	.595

As depicted in Table 2, ( $t(40) = -.389, p = .699$ ) [-2.06, 1.39]; thus, it is concluded that the difference between experimental group I and experimental group II was not significant in terms of proficiency level. To find the answer to the first research question, the posttest results of the two experimental groups were compared.

TABLE 2

Independent Samples t-test: Experimental Group I vs. Experimental Group II.

F	Sig.	t	df	Sig. (2-tailed)	MD	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
.254	.617	-.389	40	.699	-.333	.856	-2.06	1.39

As can be seen in Table 3, the mean difference between experimental group I ( $M = 23.10$ ) and experimental group II ( $M = 24.08$ ) is negligible. By considering the independent samples t-test results ( $t(40) = .253, p = .591$ ) [.36, 1.01], it can be assumed that the difference between the two groups was negligible, and the effects of PBL on experimental group I with homogenous peers in the group and experimental group II with heterogeneous peers in the group was not significantly different.

TABLE 3

Means of the Experimental Groups on the Posttests

Groups	N	Mean	Std. Deviation	Std. Error Mean
Experimental I	21	23.13	1.23	.210
Experimental II	21	24.08	1.01	.197

TABLE 4

Independent Samples t-test: Posttest of the Experimental Groups

F	Sig.	t	df	Sig. (2-tailed)	MD	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
.318	.544	.253	40	.591	.95	.714	.36	1.01

## The Second Research Question

Two cohorts of respondents were interviewed in this study until the data was saturated. The first cohort was the respondents with a higher cognitive ability (n = 6). Table 5 shows the respondents' views about their presence in the PBL groups.

TABLE 5  
*The Ideas of the Respondents with a Higher Cognitive Level*

Themes	Number of Respondents	Sample Quotation
workload	5	My friends refer to me to make the final decision. I take notes like others, and I write the conversations before we practice them. Then, I have to work more than others. I set activities in the group.
stress	4	If there is a mistake, they (groupmates) blame me.
enjoyment	6	I feel like an orchestra conductor. It is fun.
Self confidence	8	At first it was stressful for me. Little by little I gained confidence through.
humiliation	3	When something goes wrong, some groupmates humiliate me. I once left the group, because they insulted me.
beneficial	9	I think as a senior, you learn more because you are part of all conversations in the group.

Overall, it can be assumed that the senior learners in the groups were satisfied with their role in PBL groups. Although they mentioned that their workload is more than other learners in the group, they also considered this issue as an opportunity to learn the new language. They also felt more confident than before as they could achieve success.

A number of issues were mentioned as challenges by the senior learners. For example, they mentioned that other group members humiliated them if the conversation or the text produced by the group was criticized by the class or by the course tutor. They also felt stressed at times, as the group members expected them to rectify all mistakes from conversations produced. Table 6 shows the views of the participants with lower cognitive levels (n = 7) about their presence in the PBL groups.

TABLE 6  
*The Ideas of the Respondents with a Lower Cognitive Level*

Theme	Number of Respondents	Sample Quotation
inappropriate division of tasks	6	I don't do the important things like him. I write the conversations
idle groupmates	6	Sometimes I sit silent and look at my group mates.
positive role of the leader	5	I like group work, and I think every group needs a leader.
leaders' decision	4	Sometimes She makes all decisions on her own. This is not good.
authority	5	She act like an authority, but she is only my classmate.
confidence	3	I feel more confident with his presence because she can has ideas to make the conversations better.
group management	3	I think if we define roles then we can help each other. The good thing is that we all search separately, but sometimes he insists of choosing his key words not mine.
positive effects of prior friendship	3	We have a very good group because we have been with each other for more than one year.

As observed in Table 6, the respondents with a lower cognitive load have different views from those with higher cognitive levels. In some cases, the respondents were not content with the presence of the seniors in their groups as they thought that the seniors acted as the sole authority in the group, made the significant decisions, and left unimportant tasks to other group members. However, some respondents believed that if the groupmates and the senior could justify and divide tasks, better results could be

achieved. As a result, those groupmates who had already worked together and had established friendships could work with each other more effectively.

## Discussion and Conclusion

The researchers in this study observed that a) the effect of PBLL tutorship on homogenous groups and heterogeneous learners is identical, and b) the views and experiences of participants in PBL groups differs based on the role assigned to them, i.e., senior of the group with a higher cognitive level, and ordinary group members with lower cognitive levels. While senior learners were more content with their role in the PBLL groups, they also believed that their mistakes were more highlighted compared to ordinary group mates. On the other hand, ordinary group members were less content compared to the senior ones, as they thought senior learners benefited more from their role in the group and had a higher chance of learning.

Fard and Vakili (2018) also explored the views of the participants in PBLL by designing problem-based vocabulary tasks. While they found that PBLL can affect the vocabulary learning of Iranian EFL learners, they realized that, in most cases, the learners are content with this approach to learning. In their study they also mentioned that more skillful language learners take more time and this decreases the confidence of the less skillful peers on PBLL groups. In addition, learners with a lower cognitive level show that they were restricted by the presence of the learners with higher cognitive levels in the role of seniors in the PBLL groups. This issue is congruent with Millrood (2002) who states that lower level learners may be demotivated in heterogeneous groups. Vaughan, Sanders, Crossley, O'Neill, and Wass (2015) observed this effect in medical education and noted that the majority of the learners in PBL classes are confined by the senior minority; however, the reasons why these minorities are affected should be investigated. Other than the cognitive thinking level, they also concluded that demographics of the participants which put them in the category of minority, such as skin color, can affect the performance of the learners. Burris, and Garton (2007), on the other hand, remark that although seniors in PBL classes benefit from PBL tutorship more than other learners, in most cases, PBL learners benefit from this mode of instruction more than conventional modes of instruction which do not challenge the learners reasoning abilities.

This study can be a reminder to PBLL practitioners that assigning the learners into heterogeneous groups may not be useful for all learners. As this study showed that PBL tutorship can have a greater effect compared to conventional language instruction, it is recommended that language teachers should assign homogenous groups in PBLL tutorship.

## The Authors

*Fahimeh Farahani* is a lecturer at Tehran University of Medical Sciences. She has been teaching English to undergraduate and postgraduate students for 18 years. Her area of research includes second language teaching and assessment.

Email: [nina\\_farahani@yahoo.com](mailto:nina_farahani@yahoo.com)

*Hanieh Kashi* is a researcher in the field of applied linguistics. Her areas of research include language teaching and assessment, and research in the second language. Her articles focus on implementing language tasks in language classes. She is currently a Ph.D. candidate at the Faculty of Languages at Azad University, Qeshm Branch. She has worked as the quality control manager of Safir Language Academy in Iran for 14 years.

Email: [Kashihanieh@gmail.com](mailto:Kashihanieh@gmail.com)

*Paria Isazadeh* is a language teacher and researcher. She holds a master's degree in language teaching and has 10 years of experience in teaching English in East Azerbaijan Province in Iran.

Email: p.eisazadeh@gmail.com

## References

- Ansarian, L., Adlipour, A. A., Saber, M. A., & Shafiei, E. (2016). The impact of problem-based learning on Iranian EFL learners' speaking proficiency. *Advances in Language and Literary Studies*, 7(3), 84-94.
- Ansarian, L., & Teoh, M. L. (2018). *Problem-based language learning: An innovative approach to learn a new language*. Singapore: Springer Nature.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1-26.
- Burris, S., & Garton, B. L. (2007). Effect of instructional strategy on critical thinking and content knowledge: Using problem-based learning in the secondary classroom. *Journal of Agricultural Education*, 48(1), 106-116.
- Carr, K. (2001). Building bridges and crossing borders: Using service learning to overcome cultural barriers to collaboration between science and education departments. *School Science and Mathematics*, 102(6), 285-298.
- Dolmans, D. H., De Grave, W., Wolfhagen, I. H., & Van Der Vleuten, C. P. (2005). Problem-based learning: Future challenges for educational practice and research. *Medical Education*, 39(7), 732-741.
- Dörnyei, Z. (1997). Psychological processes in cooperative language learning: Group dynamics and motivation. *The Modern Language Journal*, 81(4), 482-493.
- Fard, E. E., & Vakili, A. (2018). The effect of problem-based learning on Iranian EFL learners' vocabulary learning. *The Journal of Asia TEFL*, 15(1), 208-216.
- Gatehouse, K. (2001). Key issues in English for specific purposes (ESP) curriculum development. *The Internet TESL Journal*, 7(10), 1-10.
- Jonassen, D. H. (2000). Toward a design theory of problem solving. *ETR&D*, 48(4), 63-85.
- Kukulka-Hulme, A., & Shield, L. (2008). An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *ReCALL*, 20(3), 271-289.
- Millrood, R. (2002). Teaching heterogeneous classes. *ELT Journal*, 56(2), 128-136.
- Moussu, L., & Llurda, E. (2008). Non-native English-speaking English language teachers: History and research. *Language teaching*, 41(3), 315-348.
- Nabi, R. L., & Clark, S. (2008). Exploring the limits of social cognitive theory: Why negatively reinforced behaviors on TV may be modeled anyway. *Journal of Communication*. 58(3), 407-427.
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health*, 29(5), 489-497.
- Rotter, J. B. (1982). Social learning theory. In N. T. Feather (Ed.), *Expectations and actions: Expectancy-value models in psychology* (pp. 241-260). Hillsdale, NJ: Lawrence Erlbaum Publication.
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-based Learning*, 1(1), 3-21.
- Storch, N. (2005). Collaborative writing: Product, process, and students' reflections. *Journal of Second Language Writing*, 14(3), 153-173.
- Vaughan, S., Sanders, T., Crossley, N., O'Neill, P., & Wass, V. (2015). Bridging the gap: The roles of social capital and ethnicity in medical student achievement. *Medical Education*, 49(1), 114-123.
- Vygotsky, L. (1987). Zone of proximal development. *Mind in Society: The Development of Higher Psychological Processes*, 5291, 157.



- Wee, L. K. N., & Kek, M. Y. C. A. (2002). *Authentic problem-based learning: Rewriting business education*. Singapore: Prentice Hall.
- Willis, J., & Willis, D. (2013). *Doing task-based teaching: Oxford handbooks for language teachers*. London: Oxford University Press.
- Zhang, Y. (2010). Cooperative language learning and foreign language learning and teaching. *Journal of Language Teaching and Research*, 1(1), 81-83.