Chabahar Maritime University
Iranian Journal of English for Academic Purposes ISSN: 2476-3187
IJEAP, 2021, 10(4), 137-151 (Previously Published under the Title: Maritime English Journal)

Advocating for 'All for One, One for All' in English for Specific Purposes

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Research Paper IJEAP- 2109-1784 DOR: 20.1001.1.24763187.2021.10.4.9.9
Received: 2021-10-16 Accepted: 2022-01-20 Published: 2021-01-25

Abstract

As there are a multitude of cooperative learning methods, English-for-Specific-Purposes (ESP) instructors often wonder how to differentiate between the variations of specific cooperative learning methods and translate group learning principles into classroom practices. This study compares the effects of two evidence-based cooperative learning methods – Jigsaw learning and discussion-based learning (DBL) – on the achievement of psychology students in ESP education. This research drew on a nonrandomized control group pretest-posttest design. The investigator selected three intact classes including 86 master's students in psychology and assigned them to Jigsaw group (n = 28), DBL group (n = 31) and control (lecture-based) group (n = 27). Each condition received instruction according to its instructional tenets. The results of a 7-week-long treatment showed that there was a statistically significant difference among the Jigsaw, DBL and individualistic groups in terms of their overall ESP performance in psychology, $p < .5$, $\omega p^2 = .17$. The study concludes that Jigsaw learning as a highly structured-learning practice is more effective than DBL, and individualistic teaching strategies in improving psychology students' understanding of psychological concepts in English. The implication of the study suggests that the interaction pattern based on positive interdependence and individual accountability in the Jigsaw classroom works better for ESP courses in psychology.

Keywords: Cooperative Learning, Discussion-based Learning, ESP Courses, Jigsaw, Psychology

1. Introduction

The field of English for Specific Purposes (ESP) has undergone relatively rapid growth since its inception in the 1960s (Douglas, 2013; Johns, 2013). A wide range of research topics in ESP have been investigated through genre (Biber, 2006; Hyland, 2012), ethnographic (Dressen-Hammouda, 2013; Starfield, 2015), corpus (Hyland, 2008; Pérez-Llantada, 2014), identity (Işık-Taş, 2018; Tao & Gao, 2018), and learner needs (Serafini et al., 2015) studies, to name but a few. Despite the increase in our knowledge about ESP, a considerable amount of the variability in ESP students' achievement remains unknown. More than 80 percent of ESP students in the Iranian higher education still find it hard to handle their discipline-specific textbooks in their specialized English courses (Soodmand Afshar & Movassagh, 2016).

ESP courses are generally offered in Asian universities, where English is not the medium of instruction (Mostafaei Alaei & Ershadi, 2017). For example, Iranian graduate students in psychology must take a two-credit compensatory ESP course. The overall course goals are (i) to provide discipline-specific competencies and skills for students to learn the fundamental concepts of psychology in English, and (ii) to enhance students' domain-related text comprehension in English. While ESP continues to spread out and grow in the Iranian academic programs (Mostafaei Alaei & Ershadi, 2017), instructors teaching ESP face serious challenges; psychology students in ESP courses, for instance, achieve the minimum expected skills and knowledge (Nezakatgoo & Behzadpoor, 2017; Sadeghi & Tahririan, 2014). This is the case at a time when there is a growing need for university students to build up their proficiency in ESP; they enter the increasingly globalized and competitive world where multilingual literacy gained from ESP could play a key role in their success (Kirkgoz & Dikilitas, 2018). Results of past related studies provide corroborative evidence for unfavorable outcomes of ESP programs, such as lack of motivation for ESP learning (Khoshsima & Khosravani, 2014; Nezakatgoo & Behzadpoor, 2017) and dissatisfaction with ESP courses (Akbari, 2014; Khodi, 2016; Moslemi et al., 2011; Rajabi et al., 2012).

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Lack of achievement in ESP education is commonly attributed to the use of instructional strategies that lack a theoretical base and are, in the main, teacher-centered (Mostafaei Alaei & Ershadi, 2017). Recent research also suggests that ESP may be unsuccessful because it relies too much on individualistic types of learning, which provide no room for student engagement (Mavri & Hadjiconstantinou, 2018; Saavedra & Opfer, 2012). Faculty are often criticized for their advocacy of traditional, lecture-based approaches in teaching ESP (Çelik et al., 2018; Rajabi et al., 2012); they adopt a teaching strategy that promotes committing a set of facts to memory, which is basically individualistic learning. Students are then required to learn ESP materials almost exclusively through translation, reading and memorization (Rajabi et al., 2012; Sadeghi & Tahririan, 2014). Such failure can be interpreted as an indication that there is a need to create opportunities for students to actively participate in classroom activities (Belcher, 2006; Gorvine & Smith, 2015; Wichanpricha, 2020).

A major challenge that ESP instructors face is to respond to a call for action in ESP teaching. The urgent question is: "What might they do differently to boost students' learning outcomes?". Educational experts in related fields have typically addressed this issue by recommending the use of instructional techniques that promote active learning and learner engagement through group learning (Gagné & Parks, 2013; Habbash, 2021; Jacobs & Renandya, 2019; Johnson et. al., 2006). Group learning has definitely become central in supporting learning outcomes and providing key benefits in different learning tasks in educational settings. One such instructional strategy is cooperative learning (CL) in which interactive groups are used to enhance students' learning outcomes (Johnson et al., 2018).

CL is mainly informed by social interdependence theory (Deutsch, 1949), suggesting that the essence of a group is the interdependence among members. According to Deutsch (1949), one of psychological processes that results from interdependence is *cathexis*, i.e., the concentration of psychological energy on individuals outside of oneself, such as peers. This theory posits that cause and effect can go both ways; in other words, cooperation influences and is influenced by mutual assistance. In this way, interdependence among members results in the group being a dynamic whole. Additionally, CL draws from a theoretical work positing that knowledge exists in interactive dimensions. Such a perspective - social constructivism - is based on the work of Vygotsky (1962), who contended that learning occurs primarily in social settings, i.e., through collaborative interactions with others. In fact, social constructivism puts a high premium on the "socially and culturally situated context of cognition" (Duffy & Cunningham, 1996, p. 175).

That said, there are so many CL methods that the task of selecting one can be overwhelming, and, at times, it can be difficult to differentiate between the variations of specific CL methods (Davidson & Major, 2014). This has led to a situation in which faculty seem uncertain about which CL method to rely upon (Carlsmith & Cooper, 2002), particularly in ESP courses in psychology (Sadeghi & Tahririan, 2014). Taken together, CL represents a family of instructional techniques (Supanc et al., 2017) and the available literature on CL suggests that cooperative activities are designed with differing degrees of structure (Cecchini et al., 2020). Some CL techniques follow a high-structure format since they draw heavily on the two key principles of CL (Abramczyk & Jurkowski, 2020; Supanc et al., 2017), i.e., positive interdependence (goal attainment is affected by their own and others' actions) and individual accountability (doing one's part and facilitating the work of others in the group). In essence, these two principles guide cooperative behavior (Johnson et al., 2018): (a) all group members' work is necessary for the tasks to be complete (positive interdependence), and (b) each member of the group has to individually contribute to the group's tasks (individual accountability).

The principles of individual accountability and positive interdependence are applied to the prototype of a high-structure CL method – Jigsaw. In cooperative Jigsaw activities, groups work on some issue and collate information to achieve a final outcome. The Jigsaw technique is mainly characterized by group bonding, the perception that one's success depends on one's own performance and that of others (Jacobs & Renandya, 2019; Johnson & Johnson, 2018). Jigsaw is a carefully planned learning strategy that requires "students work together in small groups supporting each other's learning processes" (Abramczyk & Jurkowski, 2020, p. 296). Unlike Jigsaw, discussion-based

learning (DBL) represents a low-structure CL format since during its implementation, those two features noted earlier receive less attention (Johnson & Johnson, 2018; Supanc et al., 2017). DBL, involving immediate, in-class discussion, encompasses informal group learning activities; students usually assign themselves to ad-hoc groups with two to six members, for only for a few minutes or up to one class period. The logic behind DBL is to task students to exchange various "interpretations, explanations, approaches to a problem" (Herman & Nilson, 2018, p. 1).

There is no denying that extensive lines of research have documented the benefits of CL (Kablan, 2014; Nãdrag, 2017; Yoshimura et al., 2021). CL also remains highly influential in ESP education (Novitasari, 2019; Pazos et al., 2010; Supanc et al., 2017); nevertheless, choosing group learning methods has been a challenge for many (Davidson & Major, 2014). Instructors willing to employ CL, for example, may wonder which CL conditions are most effective in ESP courses; sufficient evidence of effectiveness of CL methods, with regards to ESP courses in psychology, is limited (Mavri & Hadjiconstantinou, 2018). In fact, successful implementation of CL remains elusive in ESP classes and there is still much to be learned about the conditions under which CL is most effective.

Overall, the main assumption in the present study is that if CL plays a major part in education in general, its positive impact could then be extended to ESP in psychology in particular. With this in mind, one would hope that the potential findings of this study could help expand faculty's teaching repertoire, specifically in ESP settings where students are often reported to fare badly. Given the contention that ESP courses have to be examined in the context in which they occur (Cheng, 2011), and that little research has ever been conducted to compare the effects of structuring conditions under which CL is effective in ESP courses in psychology, this investigation sets out to address the following exploratory research question:

Research Question One: To what extent is there a difference in ESP achievement test scores between psychology majors who are taught based on Jigsaw, DBL, and individualistic teaching techniques?

2. Methodology

2.1. Design

This quasi-experimental study compared the effects of two instructional strategies –Jigsaw learning and DBL – on students' ESP performance in psychology by means of a researcher-developed test. For this purpose, the current study employed a nonrandomized pre-test post-test control group design. There were three intact classes, two of which were considered as the experimental groups (the Jigsaw group and the DBL group). The third one as a control group received the individualistic teaching.

2.2. Participants

The accessible population of the study was the master's students in psychology who had taken a compensatory ESP course in the 2019-2020 first semester at Islamic Azad University located in the northwest of Iran. Meeting one hour and a half per week over a 16-week semester, this course provides skills for students to comprehend the fundamental concepts pertinent to psychology in English.

For experimental research designs, the minimum sample size recommended by Onwuegbuzie and Collins (2007, p. 289) was taken into account. Using the convenience sampling method, the investigator selected a sample of 86 psychology majors from three intact classes out of four existing groups. He assigned the whole class to a condition, i.e., to cooperative group (n = 28), DBL group (n = 31) and individualistic group (n = 27). The study group consisted of 34 males (39.5%) and 52 females (60.5%), whose mean age was 25.30 years.

2.3. Measuring Instrument

For this study, I constructed a 35-item psychology test in English to gauge students' text comprehension at pretest and posttest (see Appendix for a sample of test items). The test drew on the five categories of reading comprehension proposed by Barrett (1968), which are (a) Literal comprehension, (b) Reorganization of ideas, (c) Inferential comprehension, (d) Evaluation, and (e)

Appreciation. As an initial step, I developed a blueprint for selecting appropriate test items for each reading skill. The test comprised two booklets. The first booklet, the reading booklet, consists of three reading texts, which I took from Readings in Psychology (Hashemian, 2010). The topics of the texts were related to (i) habituation and sensitization, (ii) classical conditioning, and (iii) operant or instrumental conditioning. The second one was the question booklet which consisted of a total of 40 questions with different formats, i.e., multiple-choice questions (MCQs), true/false (T/F), fact/opinion, and open-ended questions. The general guidelines for the test and information of students appeared on the cover page. I also assigned scores to the questions on the basis of their weightage that I determined earlier. Scores appeared next to each question.

Then, I gathered validity and reliability-related evidence for the test. Several types of validity evidence can be gathered. For this instrument, I assessed two types of it as they were applicable to the test. First, through a systematic examination of the test content, I assessed the test's content validity. I did this with the help of expert judges, evaluating the test for its representativeness. During the test construction process, two experts in psychology from two different public universities located in the province, where the research site was, examined the test for its content validity. The lecturers chosen for their expert judgments had adequate years of teaching experience in teaching ESP courses in psychology. On the basis of their feedbacks and suggestions, I revised the test (Table 1).

Table 1: Validity and Reliability Information of the ESP Reading Comprehension

Types of Validity & Reliability Evidence	Means of its Achievement	Result(s)
Content Validity	A panel of two competent experts evaluated the measure.	The following corrections and modifications were made: -test directions were made clearer, -confusing & ambiguous test items were modified, - scoring methods were made consistent, -overly difficult & complex sentence structures were modified
Internal Consistency (Split-half Reliability)	I split the measure into two sets. After testing the entire set, I calculated the correlation between the two sets of responses.	The coefficient of consistency was calculated: $r = 0.81$, indicating an acceptable degree of reliability

I conducted two pilot studies before the main research began. During the first one, the instructor of an ESP course administered the test to 33 pilot participants. Then I calculated the item discrimination which ranged between .48 and .66 for each test item. On the basis of the results, five items were deleted. After the modification, the instructor administered the revised version of the test with 35 items to another pilot group of 25 students. The item difficulty and item discrimination estimates indicated that all the items on the test had an acceptable level of difficulty and suitable power of discrimination. During the second pilot study, I estimated the reliability of the test, using the split-half reliability method (Table 1). Once again, the instructor administered the test to 25 pilot participants. When the scoring was over, I split the scores into two halves and calculated the correlation between them. The estimated internal consistency reliability coefficient indicated an acceptable degree of reliability (.81) of this reading comprehension test in psychology for the present ESP sample. Ultimately, I developed the 35-item reading comprehension test for the ESP course. The breakdown of the questions was as follows: (a) Literal comprehension = 12 questions, (b) Reorganization of ideas = 8 questions, (c) Inferential comprehension = 8 questions, (d) Evaluation = 4 questions, (e) Appreciation = 4 questions.

2.4. Materials

The instructional material used for the ESP course was *Readings in Psychology* – a textbook written by Hashemian (2010). This textbook is for graduate students who take courses in psychology in the English language. It provides extensive coverage of the field and acquaint students with a wide range

of topics. In this study, the instructor opted for seven topics to teach, namely behavior disorders and their treatment, personality, motivation, intelligence and its measurement, thinking, development, and social influences on behavior.

2.5. Procedures

To address ethical issues pertinent to this research, I took several necessary steps to ensure the pedagogical rights of participants. In spite of the fact that students had taken ESP as a compulsory course, the study began before the date they could add or drop courses from the program; therefore, participants had the option to withdraw. The instructor told students at the outset of the research that they would participate in a study and had the choice of continuing the course with her in another class. To be clear, she informed students about (i) their unconditional right to withdraw from the study at any time, (ii) the purpose of the study, its duration, and procedures, and (iii) whom to contact and ask questions about the study.

An instructor who had 11 years of teaching experience taught all the groups in the study. She received one-month training in using Jigsaw learning and DBL. During the training, I dealt with such issues as the implementation procedures of the interventions; the required small group and social skills, and the introduction of the research measure. I also provided her with information about the research objectives and the rationale for selecting Jigsaw learning. At the beginning of the semester, we selected three intact classes; the breakdown of the groups was as follows: Jigsaw group (n = 28), DBL group (n = 31) and individualistic group (n = 27). The study lasted for 10 weeks (ten sessions in total). The groups met for one hour and a half per week. Before the interventions began, the instructor administered the pretest to all participating students. In the Jigsaw group, she informed the students that they would receive instruction different from the typical teaching style that they had already had. During the first week of the course, the instructor introduced students to the philosophy of CL. She had students form their groups of four to five based on their own preferences. Since groups should stay together long enough to be successful (Johnson et. al., 2006), the instructor had them form formal CL groups that stayed together until the end of the study. She delivered the lessons to the Jigsaw group according to the dynamics of Jigsaw learning.

The Jigsaw procedure was as follows: First, the instructor assigned students to formal groups of four to five who stayed together for several weeks. She had each group member to study and research one subdivision of a specific psychological topic from the textbook for their next session. For instance, a major topic that instructor presented was about motivation, which included the subtopics such as early ideas about motivation, primary motives, theories of learned motivation, and some human motives. During the following class period, students temporarily left their home groups to form expert groups that had already studied the same subtopic. In fact, in expert groups groupmates worked together with those from other groups who had the same topic. The expert groups had two tasks: (i) to master the material and (ii) to prepare to teach their groupmates information about the subtopic assigned. Finally, they returned to their original home groups and taught the subtopic to other group members, round robin style. In this way, each student in the Jigsaw group became an *expert* on a concept and was responsible for explaining it to the other groupmates. Working together, the group merged the different parts to figure out the *puzzle*. The instructor's role during the cooperative (Jigsaw) practice was to systematically move from group to group and assist students.

The instructor also taught the DBL group according to the typical procedures common in DBL. In each session she asked students to read a specific topic in their textbook and become prepared for small-group discussions for their next session. Prior to discussing their ideas in small groups, the instructor asked students to study a psychological topic from the appropriate book chapter (e.g., motivation) and prepare and gather their thoughts for their next session. A major learning goal in the course involved training students to read the textbook. During each lesson period, she organized informal, ad-hoc groups of four to five. The instruction in this group proceeded using group discussion. To be specific, each lesson began with an instructor presentation to stimulate their background knowledge of students. Upon her introduction of the topic, she posed a question for each group. Questions were either evaluative (e.g., Why do you think …?) or inferential (e.g., What do

you predict …?) in order to provoke their thoughts. Students worked in their groups and discussed the material for about 10–15 minutes while recording their ideas in writing. Then, a group member was called on to provide the answer to the question. In fact, the final product took the form of a written answer to the instructor's question, which the student later presented to the whole class.

As for the individualistic group, they received the same content by the same instructor. Since lecturing heavily centers on the instructor's presentation or explication, each session began with the instructor's extended presentation. In fact, she read and then translated the factual information related to the subject matter. She elaborated on what was being taught in students' native language and provided answers to their questions. When it was needed, the instructor used presentations in PowerPoint format, reference notes and provided students with bilingual handouts in order to have students follow the lectures.

Ultimately, at the end of the experimental interventions, the instructor administered the researcher-made test again to gauge participating students' understanding of the ESP materials taught during the course.

3. Results

Except for the effect size estimation, all statistical analyses were conducted by IBM SPSS Statistics for Windows version 22.0, and the significance check (*F* test) threshold was determined using $p < .05$. The descriptive findings (Table 2) suggested that there were group differences both in the pretest and in the posttest mean scores of the ESP test.

Table 2: Descriptive Statistics for the ESP Pretest and Posttest Scores

		Pretest		Posttest	
Group	*n*	*M*	*SD*	*M*	*SD*
Jigsaw Group	28	9.44	1.90	16.96	1.76
DBL Group	31	10.03	1.91	15.40	2.83
Individualistic Group	27	10.55	2.21	14.30	2.65

Note. *M* = Mean; *SD* = Standard Deviation

In order to control for the initial group differences in the ESP pretest scores, a one-way analysis of covariance (ANCOVA) was run. Normality check using Shapiro-Wilk statistic, indicated a non-significant result. Besides, the inspection of the homogeneity of regression (slopes) showed that the relationship between the covariate (ESP pretest scores) and the dependent variable (ESP posttest scores) did not differ significantly as a function of the independent variable (instructional types), $F(2, 80) = 1.991$, $p = .14$. The Levene's test of equality of variances was set to 0.01 (Field, 2009). Results showed that the variances were equal, $p < 01$.

As Table 3 indicates, after adjustment for the ESP pretest scores, there was a statistically significant difference in the ESP posttest scores of the Jigsaw group (adjusted $M = 17.12$), the DBL group (adjusted $M = 15.39$) and the individualistic group (adjusted $M = 14.14$), $F(2, 82) = 9.94$, $p = .000$. Compared to other effects in the literature, the less biased effect size (Winkler & Hays, 1975) – partial omega-squared (ω_p^2) – indicated that the effect size for the between-group difference was small, 0.17.

Table 3: Result of ANCOVA for ESP Scores

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Omega Squared (ω_p^2)	Observed Power
ESP Pretest	28.088	1	28.088	4.771	.032	.081	.579
Group	117.066	2	58.533	9.942	.000	.173	.981
Error	482.754	82	5.887				
Total	21363.500	86					

$p \leq .05$

A follow-up analysis was performed with the Bonferroni procedure to control for Type I error across the three pairwise comparisons ($\alpha' = .05/3 = .016$). The estimated marginal means showed that the students who received Jigsaw had significantly higher ESP posttest scores than the students who received DBL and also than those who received individualistic learning. Additionally, the difference between DBL group and individualistic learning group was only marginally significant ($p = .053$).

4. Discussion

This study was an initial effort at comparing the effects of Jigsaw learning, DBL, and individualistic teaching on ESP achievement of psychology students. Results indicated that these teaching strategies had statistically differential effects on student performance in psychology-related text comprehension in English, a finding which is consistent with this line of research (Kablan, 2014; Nãdrag, 2017; Supanc et al., 2017). However, this study extended past work by indicating that students' enhanced reading comprehension of basic concepts of psychology may be partly contingent on differing amounts of structuring employed.

Possible explanations for these results are provided in the following observations. Some courses such as ESP in psychology require students to deal with challenging topics that incorporate various pieces of information necessary for overall mastery. The interaction pattern in Jigsaw could help students comprehend some portions of the text that they failed to understand in working independently. When students work in Jigsaw groups, they could exchange their individual responses to the text, transfer personal meanings, and create deeper comprehension in the group. This might be an indication that Jigsaw has the potential to improve ESP psychology students' performance in reading with regard to (a) literal comprehension, (b) reorganization of ideas, (c) inferential comprehension, (d) evaluation, and (e) appreciation. Another reason for the effectiveness of the Jigsaw tasks for psychology students may be that the Jigsaw classroom could provide an opportunity for them to actively engage with the text and learn core concepts of psychology effectively. This may lead to a recognition that reading psychology texts can, in part, be seen as a collaborative experience, in which comprehension is affected by social interactions (Alexander & Fox, 2004; Finkbeiner, 2006), an idea that has been emphasized by Vygotsky's (1962) zone of proximal development (ZPD). In Jigsaw activities, reading becomes a social event and readers can support one another to do reading tasks, with the result that successful readers can help less successful ones in their meaning-making process. The recent emphasis on collective dimensions of reading suggests that sociocultural factors play important roles in the reading activity (Koda, 2005). As such, it is hoped group orientations in reading ESP materials will receive proper recognition, as well.

Additionally, students in the Jigsaw group unlike those in the DBL group were positively affected by the Jigsaw tasks. One possible reason may be that the Jigsaw classroom promotes learning outcomes because of its focus on peer-to-peer teaching (Topping, 2005). As the level of engagement with the subject matter in Jigsaw is greater than DBL, it is most likely that the level of text comprehension and retention could vary. Explaining and teaching a concept to other members in Jigsaw groups seems to help enhance one's own comprehension and provides the opportunity for students to understand, evaluate, and appreciate better the material. This finding provides evidence to the understudied model of the learning pyramid developed by National Training Laboratory in the early sixties, in which the retention rates in peer tutoring is considered much higher than group discussion and individualistic learning.

Another explanation may be attributable in part to the synthesis of basic elements of CL which fueled the group's collective effort and led to significant gains in reading comprehension assessment. This finding adds further support to the basic premise of social interdependence theory, i.e., the interaction pattern determines the outcomes of the situation (Deutsch, 1949); not all group interaction styles could be equally successful (Pazos et al., 2010). Because Jigsaw learning is associated with positive interdependence and individual accountability (Johnson & Johnson, 2018), these two key elements may serve as a powerful incentive for students' engaged reading. It is more often the case that ESP teaching becomes more challenging when students are unwilling to read the course material (Mostafaei Alaei & Ershadi, 2017). An effective way to motivate and engage students in reading ESP

materials is to increase social interaction among students. They may realize that reading is a way of accessing information and communicating ideas. This may justify use of Jigsaw learning as an effective technique which boosts students' achievement in ESP education in psychology.

Another finding of the present study indicated that the difference between DBL and individualistic learning was marginally significant. This finding shows that the benefits of CL methods may be tempered by structuring conditions, suggesting that CL implementation in ESP courses in psychology must be done with care. Although positive effects of group learning in the form of DBL are evident in the literature (Xiyang et al., 2020), small group instruction, like DBL, often addresses some tenets of CL, but not all. Thus, one could argue that CL success is dependent on how cooperation is structured; if either of the CL elements is absent from group activities, instruction could be less effective than expected, a finding confirmed in other studies (Tomcho & Foels, 2012).

A lesson that we learned from this study was that Jigsaw considerably decreased the participating instructor's heavy workload that she usually underwent in large classrooms in ESP courses. Apparently, as students take more responsibility for their learning in Jigsaw classes, instructors' workload decreases, and consequently they can find more time to monitor students' progress. An important factor by which ESP instruction can be informed is the instructor's regular progress monitoring. Progress monitoring creates an opportunity for ESP instructors to tend to students' needs, for example, their comprehension difficulties which might go unnoticed. Regular progress monitoring is most likely to result in students' positive gains and achievement. Thus, it is recommended that ESP instructors, while implementing Jigsaw, should track students' reading comprehension performance; it can be done, for example, through posing questions to each group randomly. Considering that there is a paucity of empirical research comparing the effects of structuring conditions in ESP education in psychology, the present study helped open up new avenues for further research in the field. Although Jigsaw learning shows promise, there are a number of unanswered questions within the framework of this study; they can direct future research and above all help move forward the related literature.

The applicability of Jigsaw learning is unclear across different subject matters in psychology. In fact, it is still unknown whether Jigsaw learning can be incorporated in the content-laden psychology curriculum. Content instructors of psychology may address this issue across the psychology curriculum. It is even unknown that CL can find acceptance among faculty and become established well into Iranian higher education. Most importantly, it is yet to be known if it is feasible to implement CL techniques in one small part of the overall program while the other areas follow the curriculum in a conventional, lectured-based manner. All of these essential questions are unanswered and call for future studies.

Besides, there a number of methodological limitations that should be taken into consideration when interpreting results. According to Faggella-Luby and Deshler (2008), one of the often-neglected factors affecting the quality of the experimental studies on reading comprehension is 'instructional dosage'. Pedagogically, this notion is composed of four interconnected factors: (a) group size, (b) instructional period, (c) frequency, and (d) duration. Group size is related to the student-to-teacher ratio during instruction. The instructional period refers to the length of each session which can be at variance. Frequency is concerned with the number of times students are instructed during a week. Duration, the final factor in the instructional dosage, refers to the optimal total number of sessions students should be instructed and the optimal length of time from start to finish.

In this study great efforts were made to ensure that the Jigsaw technique was delivered accurately every time that it was implemented; however, due to the administrative constraints imposed by the study site, instructional dosage was not duly addressed. The Jigsaw treatment was conducted 7 times in 7 weeks (a total of approximately ten and a half hours). It does not seem to be a long intervention; it is rather a short period of time in the learning history of university-level students. Students in this study may have had a stronger response to the intervention if Jigsaw had been delivered with more frequency and duration. This suggests that it is absolutely necessary to ensure that experimental studies are being implemented in the right dosage. Thus, given the notion of

instructional dosage, there is a need for more extensive and long-lasting investigations of the effects of Jigsaw.

There are also a few issues which need to be taken into account in future Jigsaw research studies with respect to the outcome measure used. I merely employed traditional, paper-and-pencil assessment to gauge ESP students' reading comprehension achievement, because I reasoned that adding more tasks would make students tired as they were being tested in a single session. However, the varied nature of reading comprehension speaks to the need of including more measures with a larger number of items in each measure in future Jigsaw studies. These additions may then increase the reliability and validity of the measures used and may also allow a closer examination of effects of Jigsaw. Among other possibilities, one additional measure could be an oral measure. Most Jigsaw studies have utilized only written measures; due to the scarcity of research using both written and oral measures of comprehension, a greater contribution to Jigsaw research may be obtained if an oral measure is used in future studies.

Additionally, it should be noted that this study did not consider the durability of the Jigsaw effects on reading comprehension of ESP students. This is usually dealt with through follow-up tests. Follow-up may be able to raise different but important issues for experimental studies. Among the issues is whether the gains are maintained, or whether the gains continue to exceed gains achieved without further intervention. As these issues are unknown, this area should be a topic of future research in which follow-up assessments are used to assess the Jigsaw long-range effectiveness.

Finally yet importantly, there remain a few more unanswered questions that we hope future studies will address; for instance, (i) it is still unclear that to what extent Jigsaw learning can be incorporated in the content-laden psychology curriculum; (ii) it is even unknown that CL can find acceptance among faculty and become established well into higher education; (iii) it is yet to be known if it is feasible to implement CL techniques in one small part of the overall program while the other areas follow the curriculum in a conventional, lectured-based manner; and (iv) most importantly, it is not evident whether the effectiveness of Jigsaw is due to instructor and participant bias; such a possibility implies that the instructor and the participants in the Jigsaw condition could have shown more enthusiasm to this type of instruction. All of these essential questions are unanswered and call for further research.

5. Conclusions

From among many factors contributing to student success in ESP courses, the ESP teaching methodology as 'the elephant in the room' has historically received scant attention in the extant ESP literature; this is partially because much of the research on ESP comes from the linguistic camp working on genre, rhetorical patterns, corpus, and the like. Furthering our understanding of the nature of classroom interaction, the present study shows that although CL methodology is not an educational panacea, it is capable of showing us that learning is not only active, but also interactive. It seems evident from the study that a properly structured interaction pattern, which reflects the key elements of CL (positive interdependence and individual accountability), could be beneficial to ESP courses in psychology. This type of teaching strategy can therefore add a new dimension to faculty's repertoire of ESP teaching.

In this study, it was not intended to introduce Jigsaw as all-or-nothing instruction. Based on the findings, we only deem it necessary to suggest that Jigsaw as a highly structured CL method be included as part of ESP instructors' classroom practices; in fact, Jigsaw can serve as one of the many resources available to ESP instructors whose priority is enhancing students' text comprehension in terms of (a) literal comprehension, (b) reorganization of ideas, (c) inferential comprehension, (d) evaluation, and (e) appreciation. I do believe that the Jigsaw technique may offer an effective alternative to traditional ESP teaching, but not to all types of teacher-facilitated instruction.

A final point deserving attention is that I did not assess students' perceptions about Jigsaw since it did not fall within the scope of this research. However, in light of the current COVID-19 situation facing the world, investigating students' attitudes toward Jigsaw deserves attention. We do

not know whether cooperation emphasized in Jigsaw tasks has the potential to transcend the confines of the classroom. Evidently, "cooperation does not come naturally" (Cecchini et al., 2020, p. 1), and it needs nurturing. This idea warrants serious consideration and extensive lines of research. One is reminded of this by what Jacobs et al. (2008, p. 109) said about groupwork: "Cooperation as a value takes the feeling of "All for one, one for all" and expands it beyond the small classroom group to encompass the whole class, the whole school and far beyond".

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Chabahar Maritime University
Iranian Journal of English for Academic Purposes ISSN: 2476-3187
IJEAP, 2021, 10(4), 137-151 (Previously Published under the Title: Maritime English Journal)

Appendix: A Sample of ESP Reading Comprehension Test

Instruction: Read **ALL** the passages and answer **ALL** the questions in the question booklet.

Line No. **Passage 1**

Not all forms of learning are permanent. Some stimuli produce only temporary behavioral changes. For example, a person usually will turn toward a sufficiently strong stimulus like an auto backfire. This orienting response is temporary. If the stimulus has no other consequences and occurs repeatedly, the response will diminish and may disappear. This phenomenon is called habituation. Human beings have a great capacity for habituating or not responding to a large number of things - nagging or untidy the spouses, crying children, snoring roommates, blaring radios, and offensive odors. We can get used to almost anything even very unpleasant experiences if they are repeated often enough.

Sensitization is the opposite of habituation. We all have experienced sensitization. Watching Alfred Hitchcock's film *Psycho* or more recently *The Exorcist* is a good example. If someone snaps his fingers during a particularly hair-raising scene, you are likely to jump. Normally, your reaction to a snap of the fingers is small, if you have any at all. But the film has so sensitized you that virtually any stimulus will provoke vigorous response. Laboratory studies of sensitization usually involve more standard stimuli than a scene from *Psycho*. For example, if a mildly painful stimulus is used, an animal at first responds by trying to escape the shock. With each repetition of the shock, the animal becomes more and more agitated and responds more and more strongly; it tries harder and harder to escape the shock. After a while, however, it stops trying to avoid the continuing shocks. At that point, it habituates to the shock, which it accepts as inevitable.

Many psychologists regard habituation and sensitization as examples of the simplest kind of learning. No new responses are brought into play and existing responses nearly increase or decrease.

An organism's survival depends to a large degree on its sensitization to potential danger. A rabbit would not last long if it ignored the stimuli that signal the presence of a fox. In the urban environment, humans need to respond to the flow of automobile traffic or an open manhole. On the other hand, it would be maladaptive if we reacted strongly to every stimulus in our environment. Most stimuli are meaningless, and habituation is thus a very adaptive response to a complex environment. The organism "conserves" its responses. Both sensitization and habituation increase an organism's chances of survival.

Most organisms are particularly responsive to certain kinds of stimuli. A house cat reacts more attentively to a rustling sound than does a dog. In addition, the cat's response to this stimulus is less likely to habituate than the dog's. The reason: Rustling sounds, usually associated with the scurrying of a small pray, are more meaningful to a cat.

Adapted from:
Hashemian, K. (2010). *Readings in psychology*. SAMT. (pp.130-131).

Passage 1

Instruction: Circle the letter of the correct answer.

1. Habituation and sensitization can be seen as …….. .
a. escaping the shocks.
b. mildly painful stimuli.
c. examples of learning.
d. maladaptive behaviors. (1 mark)

2. Which **one** of the sentences below summarizes paragraph 4 best?

a. Not all kinds of stimuli are meaningful to an organism.
b. Organisms are responsive to all kinds of stimuli.
c. All stimuli are meaningful.
d. It would be much better if we reacted strongly to every stimulus. (1 mark)

Instruction: Write T for statements that are True and F for statements that are False in the box provided. Support your answers with a phrase or sentence from the passage.

3. Many behavioral changes are temporary due to some stimuli. ☐
…… .
(1.5 mark)
Instruction: Write the complete answers.

4. Do you think it is worth paying too much attention to stimulus-response reaction? Why or why not? Give **TWO** reasons.
……
……
…… (2.5 mark)

5. In your opinion, can the meaningfulness of the stimulus override human beings' self-control? Discuss **TWO** things at least.
……
…… (2.5 mark)