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The effect of strategy-based instruction on EAP students' reading performance and reading autonomy

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Abstract: This study aimed at investigating the effect of strategy-based instruction on undergraduate students' reading performance and reading autonomy in an English for Academic Purposes (EAP) context. Test of English as a Foreign Language (TOEFL) reading comprehension tests and learner autonomy questionnaire in EAP reading were utilized to collect data. The collected data were analysed using two *t*-tests to assess the effect of strategy-based instruction on EAP students' reading performance and reading autonomy. The results of data analysis showed that the students took more advantage of reading strategies instruction on their reading comprehension; therefore, they responded positively to such intervention. However, the desired effect on their reading autonomy was not significant whatsoever. On the other hand, the collected data were analysed using multivariate analysis of variance to examine the interactional effect of the proposed method of instruction on the relationship between EAP students' reading performance and reading autonomy. The results of data analysis revealed that the only significant difference between both groups was in their reading comprehension.

ABOUT THE AUTHORS

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PUBLIC INTEREST STATEMENT

Our research interests are with regard to the fundamental nature of teaching reading strategies in EAP contexts. Reading performance and reading autonomy in EAP contexts are terms increasingly affected by reading strategies. However, the effect of reading strategies on EAP students' reading performance and reading autonomy remains unclear. Therefore, analyses were conducted using SPSS software, version 22:00. The results show that teaching reading strategies had significant effect on EAP students' reading performance; therefore, it made their reading comprehension better. On the other hand, teaching strategies did not have any significant effect on EAP students' reading autonomy, that is, they did not put in a good performance in their reading autonomy. Furthermore, on the relationship between EAP students' reading performance and reading autonomy, only students' reading performance differed by strategy-based reading instruction, that is, their performance in reading comprehension was considerably better.

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1. Introduction

English for Academic Purposes (EAP) is a large part and subdivision of English for Specific Purposes (ESP) which includes two dynamic domains, named English for Specific Academic Purposes (ESAP) and English for General Academic Purposes (EGAP). The aim of students in ESAP courses is learning English so that they can work on relevant specific targets such as economics, social sciences and mathematics. On the other hand, in formal education systems, more general academic English skills are specified for EGAP courses. The four English skills and studying skills such as note-taking, asking questions and time managing are contents taught in EGAP courses (Jordan, 1997). As a result, the aim of learning EAP is that students can use English in their professional or academic lives to meet their academic needs in a particular educational context (Gillett & Wray, 2006). Having the ability to read efficiently is necessary for EAP students because second language reading is the most required academic skill. Therefore, students' success in EAP contexts is extremely dependent on what they gain through reading. That is why in such settings, students need to read severely and that they take advantage of EAP reading syllabuses for different purposes on which instructional goals considered essential are consistently incorporated (Grabe & Stoller, 2011). Although reading is the most important EAP skill for undergraduate students of different fields of study and many teachers of Asian countries in higher education institutes teach an obligatory course subject named EAP (Huang, 2006; Moslemi, Moinzadeh, & Dabaghi, 2011), underperformance in reading comprehension is experienced by both second and foreign language students of English (Huang, 2006; Phakiti, 2006; Pritchard & Nasr, 2004). A repertoire of reading strategies and a lot of conscious practice in which strategies are used in meaningful combinations are crucial in order to help students succeed in academic environments (Grabe & Stoller, 2011). Reading strategies generally include pre-reading strategies, while-reading strategies and post-reading strategies (Bezci, 1998; Karatay, 2007, 2009; Lau, 2006; Mihara, 2011; Mokhtari & Reichard, 2002; Özbay, 2006; Salli, 2002; Shih, 1991; Tankersley, 2003; Yang, 2006). Background knowledge of students and predicting the content of the text that they read provide a basis for pre-reading strategies, that is, readers should be able to understand the content of the text by having background knowledge about the content area of the text. Therefore, pre-reading strategies are useful because using these strategies can engage appropriate schemata of students (Mihara, 2011). The aim of while-reading strategies is to understand the main ideas and important details of the text. Furthermore, unconscious processes are explicitly undergone while-reading strategies and the interactive nature of reading is shown. Whether the text has been understood or to what extent the aims of reading have been achieved is evaluated by post-reading strategies (Bolukbas, 2013).

Although it is generally clear that reading strategies play a key role in language learning, the effect of reading strategies instruction on students' reading performance and reading autonomy in EAP contexts remains a new field that deserves greater research attention. To put it another way, few studies in Iran have been conducted around students' performance and autonomy in reading focussing on strategies instruction. And, the concentration of few studies has been on the significance of EAP teaching methodologies and the requirement for principal changes of educational methods for development in reading comprehension and reading autonomy, especially EAP students' reading strategies. Furthermore, previous research works have not shown the significance of reading strategies instruction, especially cognitive strategies and their effect on reading comprehension and reading autonomy, and nor have they concentrated on the EAP situations. On the other hand, while previous studies have only focussed on the instruction of pre-reading strategies, the present study attempts to examine the effect of all pre-reading, while-reading and post-reading strategies instruction on reading performance and reading

autonomy of EAP students. Therefore, this study is of significant importance in that it provides insights into how EAP students develop reading performance and reading autonomy in language learning process, especially in terms of reading strategies training programme, and this study will be useful to EAP students in general and teachers in particular. Exploring the effect of strategy-based instruction on reading performance and reading autonomy in an EAP context will persuade students to use reading strategies purposefully and efficiently. If a significant effect of training strategies on EAP students' performance and autonomy in reading is found, this insight will help in the development of effective strategies instruction. Therefore, teaching strategies will help students to promote their use of strategies and strengthen their learning results.

1.1. Aims of the study

The present study attempts to address the effect of reading strategies instruction on students' reading performance and reading autonomy within an EAP context. In other words, the current study intends to emphasise the importance of strategic reading instruction in an EAP context as an approach to improve students' reading performance and reading autonomy. Regarding the mentioned points above, the following research questions were put into the spotlight:

Q1: Does strategy-based instruction have any significant effect on EAP students' reading performance?

Q2: Does strategy-based instruction have any significant effect on EAP students' reading autonomy?

Q3: Does strategy-based instruction have any interactional effect on the relationship between EAP students' reading performance and reading autonomy?

2. Literature review

As stated by Mikulecky and Jeffries (2004), "when learners receive strategy instruction, they build on their already-established cognitive abilities and background knowledge" (p. 183). Reading strategies are likely viewed as a problem-solving activity which is used instead of translating. Therefore, students' confidence and motivation can be enhanced through this approach. In recent years, students' performance and autonomy in reading have been developed into a vital argument which has affected by training strategies because teaching strategies help students not only with their second language reading performance but also with responsibility for their own learning (Le, 2009).

2.1. The effectiveness of strategies on reading performance

According to Kirkkilic and Akyol (2007, as cited in Bolukbas, 2013), students can get the general context and the structure of the text, store the meaning of the text in their memory for a long time and call it to mind without difficulty using reading comprehension strategies. Reading comprehension strategies from Hardebeck's point of view (2006) are using mental actions, tools or plans to promote and develop readers' comprehension. Furthermore, reading comprehension strategies help readers concentrate on the contextual cues to get the meaning while reading the text.

2.2. The effectiveness of strategies on reading autonomy

Reading strategies lead to developing lifelong learners at various levels and help learning the content more successfully and autonomously (Rausch, 2000). Since reading transfers the conceptual developments and cultural knowledge gained to other languages and makes significant effects there, then it is led to language learning autonomy (Talebi, Maghsoudi, Mahmoudi, & Samadi, 2014). From River's point of view (1987, as cited in Pang, 2008), despite the fact that the most seminal skill for learners at various levels is reading comprehension, yet there are students who cannot read in a comprehensive and autonomous way. In recent times, the most

significant role in language learning has been the concept of "autonomy". Learner autonomy involves "the learner's willingness and capacity to control or oversee her own learning" (Thanasolus, 2000, p. 117).

In the area of language-learning strategies, developing learners' learning strategies into self-guided and independent learning makes the promotion of autonomy in language skills (Dafei, 2007; Little, 2007; Thanasolus, 2000). That is probably why Oxford (1999) states that "learning strategies play a key role in autonomy. Strategies, when defined as specific actions or behaviours by which the individual learner attempts to improve his/her language learning, reflect the learner's degree of autonomy and are mechanisms by which the learner develops still greater autonomy" (p. 111).

There are a number of previous studies concerning students' performance and autonomy in reading that need to be reviewed to make a transparent background towards the research conducted within this domain.

In a theoretical research on autonomous learning, Ajideh (2009) emphasised the key role of teaching methodology and metacognitive strategies in ESP classes as a result of reform in teaching and curriculum. He showed the differences between ESP and general English by asserting that specification of learners' language needs as well as metacognitive strategies for learning the language autonomously are basic essentials of ESP courses. He pointed out that ESP has been arisen from the communicative features of language teaching which its main purpose was practicality of learning and language use needs for people around the world who needed English for different specific purposes. He also disapproved of two models of language use recommended by Hutchinson and Water (1987) claiming that ESP is an approach focussing on language learning based on learner needs, but from Widdowson's (1983) point of view, it is a discourse process approach in which the focus of ESP is on both systemic knowledge and schematic knowledge. Finally, Ajideh's conclusion was that there was a need to foster autonomy in ESP course design in Iranian EFL teaching context. In this way, using metacognitive strategies for ESP learning was effective.

In another study conducted with regard to reading ESP materials, Jahankohan and Shahrokhi (2014) examined the impact of word knowledge and reading comprehension strategies on learners' autonomy. The results of the study showed that although word knowledge approach confirmed to be a better method in comparison to conventional method in teaching reading comprehension, the observed difference was not significant. In sum, knowledge of word recognition solely cannot promote EFL learners' autonomy in ESP contexts, but based on the findings of the study, the word knowledge and reading strategies instruction together significantly promoted EFL learners to be more autonomous in reading ESP materials. Therefore, reading comprehension strategies were useful to construct meanings effectively. Further, reading comprehension strategies enhanced students' metacognitive awareness and made them reach self-control level of reading comprehension strategies use.

In a study by Course (2017), she aimed to investigate the role of using reading diaries and strategy instruction to English language teaching trainees in their autonomy and language learning strategies. The results indicated that the participants initially used fewer language strategies and in fewer combinations, that is, the students' initial use of reading strategies was ineffective. Following the intervention and use of reading diaries, they started using strategy clusters and chains. Therefore, reading diaries were instrumental in fostering learner autonomy and promoting use of metacognitive strategies which helped learners employ reading strategies more effectively and led the learners to adopt different strategies in different combinations.

In another study carried out by Young (2003), she examined the effects of instruction in pre-reading strategies on reading comprehension. The results of the study revealed that not only did

the students learn pre-reading strategies but they were eager to apply the strategies. Therefore, the students' effort during the instruction in pre-reading strategies observably became more apparent and pre-reading strategies set the students up for a successful read, thereby their reading comprehension strongly influenced.

In a similar vein, Mihara (2011) intended to investigate the effects of two pre-reading strategies, that is, the effects of vocabulary pre-teaching and comprehension question presentation on EFL/ESL students' reading comprehension on the one hand and the relationship between students' English language proficiency and their reading comprehension on the other. The findings showed that vocabulary pre-teaching was less effective for Japanese students, although students with higher English language proficiency outperformed lower level students regardless of which pre-reading strategy they used. Therefore, she concluded that pre-questioning was a better pre-reading strategy, but that a vocabulary strategy may be effective as a post-reading strategy.

3. Method

This research study offered an instructional design based on reading comprehension strategies when reading in a foreign language within an EAP context. The research design in this study was a quasi-experimental design using a quantitative research approach. It is worthy of note that the researcher prevented leakage from one group to the other because the equal number of students was not conceivable and as stated by Griffee (2012), "it is often impossible in educational research at the classroom level to ensure that both the control and experimental groups are equivalent because TREEs (Teachers, Researchers, Educators, and Evaluators) seldom control the assignment of students to classes" (p. 72).

3.1. Participants

Forty-five undergraduate students as two intact classes of two fields of study, including English language translation and English literature at Islamic Azad University of Sanandaj, participated in the study. Oxford Placement Test (OPT) was used to determine the students' level of English language proficiency at the outset of the study. Then based on the Common European Framework (CEF), 33 students whose scores fell into the range of 40–47, that is, those students who were at the same level of English language proficiency, were assigned as the participants of the study. The selected participants were labelled as control and experimental groups, but those students whose scores did not fall into the range of 40–47 were intangibly eliminated and they were not considered as the participants of the study because the researcher needed students at upper intermediate level for the administration of the TOEFL test. The control and the experimental groups comprised 15 and 18 students, respectively, whose ages ranged from 19 to 26 years old and the whole number of female and male students was 20 and 13, respectively.

3.2. Data collection

In this research study, the researcher used three instruments for data collection. A detailed description of these instruments, which were administered in three phases, is as follows:

3.2.1. OPT

OPT (Appendix A), including 5 parts and a total number of 60 questions, was used to determine the students' level of English language proficiency. The students' level of English language proficiency was measured in accordance with the CEF.

3.2.2. TOEFL reading comprehension tests

Reading comprehension tests (Appendices B and C) adopted from the 2003 TOEFL Preparation Test, including 5 parts and a total number of 50 questions, were conducted before the instruction (pretest) and after the instruction (post-test) in order to measure the students' reading performance. The "TOEFL reading comprehension test" was used because it had been implemented in a similar context. To ensure the appropriateness of the test, its reliability was measured prior to the

study. The reliability result of the test using Cronbach's alpha formula revealed that it was in an acceptable range (r = .608). In addition, the validity of the test was conducted and it was .762.

3.2.3. Learner autonomy questionnaire in EAP reading

Learner autonomy questionnaire in EAP reading (Appendix D) designed by Saricoban and Alyas (2011), including 35 items on a 5-Likert scale (N = Never, R = Rarely, S = Sometimes, O = Often and A = Always), was administered to determine the students' reading autonomy. It comprised mainly statements measured on a scale of 1–5, considering that the answers were a scale of never–always. Therefore, students' scores on the questionnaire were calculated out of 175. The reliability coefficient of the questionnaire was .776. It is also worth mentioning that some of the questions seemed to demand reverse scoring, that is, transforming the answers on a scale of 5–1. Therefore, the researcher did this before computing students' total scores and conducting many psychometric analyses (e.g., reliability analysis) so that high scores on the questionnaire can reflect relatively high levels of the attribute being measured by the questionnaire.

3.3. The process of teaching

In order to make sampling fairly homogenous in terms of the students' level of English language proficiency, the researcher just included those students whose scores on English language proficiency test (named "Oxford Placement Test") used in this study fell into the range of 40–47, that is, upper intermediate level, based on the OPT scoring rubrics and ignored the rest.

Initially, the researcher performed the preliminary analysis to ensure that there was no violation of the assumption of normality. As shown in Table 1, there was no violation of the assumption of normality because Skewness and Kurtosis were between −2 and +2 for the variable.

After administrating the OPT, three more phases, including prior to the treatment (pretest), treatment (reading strategies instruction) and following the treatment (post-test), were conducted. It should be noted that the instructor assigned the same reading comprehension tests and reading autonomy questionnaires in their academic reading course to the two groups, and the same instructor implemented strategy-based instruction procedure. A detailed description of the three phases is as follows.

3.3.1. Prior to the treatment

Before the students in the experimental group received any instruction, all the students in the two groups were asked to answer the pretest of reading comprehension to measure the students' reading performance. The allotted time for answering the test was 55 min. The exam papers were collected and the students' scores were measured based on the TOEFL scoring rubrics, that is, the students' scores were calculated out of 67.

In order to locate the students' reading autonomy, learner autonomy questionnaire in EAP reading was run before the instruction. Assessing learners' degree of autonomy in reading English materials was the purpose of this questionnaire.

3.3.2. Treatment (strategy-based reading instruction)

Instruction period was about 8 weeks and it is described as follows:

The strategy instruction phase was started a week after the students participated in the pretest. The students in the experimental group received reading strategies instruction in eight 60-min study sessions (one session per week), but the control group did not receive strategies instruction programme as did the experimental group during the 2-month period of this experiment. What this means is that the teacher just conducted their reading lessons as normal, following the same topics in the curriculum for the academic reading course, the same text book and the same number of study sessions.

Table 1. Descriptive statistics for normality of the scores

	N	Minimum	Maximum	Mean	Std. deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. error	Statistic	Std. error
VAR00001	45	32.00	45.00	40.37	3.07	−1.07	.35	.57	.69
Valid N (listwise)	45								

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Teaching reading comprehension to the experimental group was as follows:

The teacher dedicated the first three sessions to teaching the techniques, including advance look at text to see its layout and illustration, anticipating possible content of text, looking for highlighted words or expressions, paying attention to meaning (semantic and pragmatic) rather than form (linguistic features), looking for relationship between main ideas (topic sentences) and details (skimming), looking for the organizational aspects of text in terms of its typical structure (e.g., cause/effect, compare/contrast etc.), making critical and personal response on the text and reading text again to summarise text meanings. Then, she spent the other five sessions on practicing reading strategies (see Appendix E) so that the students can learn the principal reading skill very well.

As an introduction to the first lesson, students were told that they were going to learn about reading strategies. For the purpose of ascertaining participants' interest and willingness to be engaged in the strategic reading instruction programme, three simple questions were asked of the experimental group about the change in their learning environment: (1) Have you ever heard of the term "reading strategies"? (2) What specific strategies did you use in reading? (3) Do you want to learn more about how you can read more effectively? By introducing the concept of "reading strategies", the students were keen to learn what it is. When the teacher started her reading lesson by asking the students to think of strategies, they could have come up with the students immediately became enthusiastic. Clearly, the classroom process of reading strategy instruction did not always meet with success. Some students' degree resistance to such strategy instruction was also perceivable. After this preliminary discussion, all the students were referred to handouts, including eight reading strategies taken from Holschuh and Kelley's (1988, as cited in Zhang, 2008) framework (Appendix E). This model was a repertoire of effective reading strategies for the participants in connection with reading texts in academic contexts. The reading strategies consisted of three stages (pre, while and post-reading strategies), but the definitions were not provided. The strategies shared included mainly cognitive strategies such as "previewing and surveying", "predicting content", "scanning for highlighted words or expressions", "focussing on meaning, not form", "identifying main ideas and supporting details", "identifying organizational patterns of text", "giving personal response" and "reviewing to summarise text meanings". The whole class was then divided into small groups and asked to talk about what each of the strategies meant to them by supplying definitions, what situations would be appropriate for using such strategies so that reading comprehension would be influenced and why such strategies should be used. After the discussion, while the reading texts adopted from the book *Quest 3* written by Hartmann and Blass (2007) were collaboratively processed, the students were asked to explain what strategies should be used, and how, why, when and where such strategies should be used.

When teaching reading strategies through passages from the book *Quest 3*, the teacher intentionally involved the students in the discussion of the strategies and then asked them to use the strategies in the reading tasks in small groups with reference to pre, while or post-reading strategies. When asking the students questions about text content, the teacher did not explicitly tell them what strategies were to be used in the beginning. Instead, they were encouraged to make an effort to experience how those particular strategies could become available and useful in the context; therefore, feedback was provided for students' performance. Integrating strategy instruction into the reading curriculum became a design feature throughout the training programme. The relevance and effectiveness of such strategy use were shared immediately among the members of each group of six students prior to any class presentations and the students benefited from the group sharing and discussion of many of instances or contexts where particular strategies were used. The activities were supervised by the teacher, and the students were ensured of opportunities to talk about their strategy use experiences after the teacher's explaining, modelling and evaluating were completed. In other words, the teacher's role was to provide the participants with instruction by using and modelling reading comprehension strategies when facing a foreign language text involving their academic fields. For instance, she modelled and encouraged the use of reading strategies during discussion, gave proper assistance as students read the texts and finally assessed students' comprehension and provided them with feedback. All in all, the aim of all teaching sessions was developing students' awareness of the importance of reading strategies with a clear

purpose, that is, using strategies to set goals and do tasks analysis for a specific reading task within academic settings.

On the other hand to teach the reading comprehension to the control group, the following steps were taken:

(1) The first step included reading out each new word two or three times and having the students repeat the words.

(2) The next step included going through the vocabulary list and explaining each word by giving examples and writing the definitions, synonyms and antonyms on the board.

(3) The last step was to read the reading passage aloud and then explain the difficult points through usual techniques such as definition and translation of the new words etc. Therefore, there was no strong instruction in the control group since they exposed only to the relatively more traditional, teacher-centred and the mode of language instruction.

3.3.3. Following the treatment

The post-test was a parallel version of the pretest consisting of the same 50 multiple-choice questions which were the same for the two groups. In order to eliminate the probability of remembering the correct answers of the test, the similar version of pretest with different items arrangement as well as option rearrangement functioning as post-test was used after implementing the treatment to detect the reading performance of the participants. Then, a week after the instruction period of reading strategies, all the students in the two groups were asked to answer the post-test of reading comprehension.

Learner autonomy questionnaire in EAP reading was distributed to all the participants to complete it after the strategy-based reading instruction programme. The questionnaire deemed talking to classmates about texts as something positive.

3.4. Data analysis

All the data were analysed using descriptive and inferential statistics by SPSS (Statistical Package for the Social Sciences) software, version 22:00. To investigate questions one and two, that is, the effect of strategy-based instruction on EAP students' reading performance on the one hand and on EAP students' reading autonomy on the other, analysis of covariance was used, but the assumption of homogeneity of regression slopes was not met with tests of between-subjects effects because the significance level of the interaction term was not greater than .05. Therefore, there was violation of the assumption of homogeneity of regression slopes; thereby, two independent samples *t*-tests were used.

To determine the effect size between the two groups (experimental and control), eta square was used and calculated manually using the formula for eta square: $t^2/t^2 + (N1 + N2 - 2)$. Therefore, the guidelines proposed by Cohen (1992) for interpreting this value included .01 = small effect, .06 = moderate effect and .14 = large effect. Moreover, since the most commonly used significance level was α = .05, the critical *t*-value was computed manually for the two-tailed test using the formula: $1 - \alpha/2 = 1 - .05/2 = .975$. If the absolute value of the test statistic is greater than the critical value of .975, then there is a significant difference in the dependent variable for each of the two groups. And to see if strategy-based instruction moderates the relationship between reading performance and reading autonomy, MANOVA (multivariate analysis of variance) was used.

4. Results and discussion

4.1. Reading performance

As for the first research question of the study concerning the effect of strategy-based instruction on EAP students' reading performance, the researcher performed descriptive statistics to organize the experimental and control groups' data on reading performance. The data of the pretest of the sample

were described in order to make sure whether the two groups were homogenous prior to conducting the main study. Yet, as far as the post-test scores are concerned, descriptive statistics as well as inferential statistics were conducted on the two groups. The descriptive statistics showed that the participants who received the treatment in the experimental group including 18 students had a mean score of 39.16 and a standard deviation of 2.43 in the post-test. On the other hand, the descriptive statistics for the control group displayed that the participants in this group consisting of 15 students had a mean score of 33.33 and a standard deviation of 1.95 in the post-test.

Table 2 reveals the descriptive statistics' results of the pretest and post-test for reading comprehension administered to both the experimental and control groups before and after the treatment. In comparison to the mean scores obtained from the students' reading performance on the pretest, their scores on post-test of reading performance increased in both groups; however, the increase in the mean scores of the control group was small. That is to say, the experimental group performed better than the control group based on the mean scores of the two groups.

Table 2. Descriptive statistics of reading performance						
Group	**Test**	**N**	**Mean**	**SD**	**Min**	**Max**
Experimental	Pretest	18	33.55	2.12	30	38
	Post-test		39.16	2.43	36	45
Control	Pretest	15	32.86	2.16	30	38
	Post-test		33.33	1.95	30	37

As it can be observed in Table 2, the difference in the mean scores between the experimental and control groups was small in the pretest; however, this difference was almost large in the post-test. As a result to determine the significance of this difference, inferential statistical analysis, that is, independent samples *t*-test, was conducted before and after the treatment.

Independent samples *t*-test offered two lines as displayed by Table 3. With reference to the table, since the sig. value was larger than .05, the first line was followed which referred to equal variances assumed. That is to say, since in this table the significance value was .86 which was larger than .05, the first line was used to report findings.

Table 3. Independent samples *t*-test for pretest of reading performance									
					Levene's test for equality of variances		**t-Test for equality of means**		
		F	**Sig.**	**t**	**df**	**Sig. (two-tailed)**	**Mean difference**	**Std. error difference**	**95% Confidence interval of the difference**
									Lower	**Upper**
Pretest of reading	Equal variances assumed	.03	.86	.92	31	.36	.68	.74	−.83	2.21
	Equal variances not assumed			.91	29.6	.36	.68	.75	−.84	2.22

To figure out if there was a significant difference between the two groups, the column labelled sig. (two-tailed) was checked. As displayed in Table 3, the sig. (two-tailed) value was above .05 which was .36; therefore, there was no significant difference between the two groups before the treatment phase.

Independent samples *t*-test offered two lines as displayed by Table 4. With reference to the table, since the sig. value was larger than .05, the first line was followed which referred to equal variances assumed. That is to say, since in this table the significance value was .38 which was larger than .05, the first line was used to report findings.

Table 4. Independent samples *t*-test for post-test of reading performance									
					Levene's test for equality of variances		t-Test for equality of means		
		F	Sig.	t	df	Sig. (two-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Post-test of reading performance	Equal variances assumed	.77	.38	7.49	31	.000	5.83	.77	4.24	7.42
	Equal variances not assumed			7.64	30.9	.000	−5.83	.76	4.27	7.38

To discover if there was a significant difference between the two groups, the column labelled sig. (2-tailed) was checked. The results of *t*-test in Table 4 reveal that the sig. (2-tailed) value was less than .05 which was .00; therefore, there was a significant difference in the mean scores on students' reading performance for each of the two groups. To determine the effect size between the two groups, eta squared was used. As Table 4 shows, in this study, $t = 7.49$. Therefore, $(7.49)^2/(7.49)^2 + (18 + 15 − 2) = 56.10/87.10 = .64$, which means that the effect size of .64 was large. In this way, the intervention was quite useful in improving EAP students' reading performance. Accordingly, the finding is in line with the previous studies conducted asserting that reading academic texts requires strategies instruction so that students can deal with specific academic tasks and improve their reading skill (Kasper, 1994). The finding also confirms that in certain academic coursework, it is necessary for students to experience reading academic texts using strategies because without experiencing academic texts and applying strategies in reading in appropriate ways, EAP students cannot be fully prepared to cope with their needs in academic reading courses; therefore, reading texts in academic settings and using strategies are interrelated and make students succeed in second language reading comprehension. By and large, students need reading strategies in order to interact with academic texts (Carrell & Carson, 1997). In addition, reading strategies play a key role in successful and unsuccessful second language learning, especially second language reading in EAP contexts. Using reading strategies effectively helps students improve their language proficiency, thereby reading strategies led to facilitation and promotion of reading comprehension. Reading strategies also help students to think of the text and beyond it while reading; thus, reading strategies are closely correlated with students' success (Anderson, 1991; Block, 1986; Devine, 1984; Hauptman, 1979; Hosenfeld, 1977; Knight, Padron, & Waxman, 1985; Zvetina, 1987).

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4.2. Reading autonomy

As for the second research question of the study concerning the effect of strategy-based instruction on EAP students' reading autonomy, the researcher performed descriptive statistics to organize the experimental and control groups' data on reading autonomy. The data of the pretest of the sample were described in order to make sure whether the two groups were homogenous prior to conducting the main study. Yet, as far as the post-test scores are concerned, descriptive statistics as well as inferential statistics were conducted on the two groups. The descriptive statistics showed that the participants who received the treatment in the experimental group including 18 students had a mean score of 119.22 and a standard deviation of 12.09 in the post-test. On the other hand, the descriptive statistics for the control group displayed that the participants in this group consisting of 15 students had a mean score of 116.60 and a standard deviation of 12.02 in the post-test.

Table 5 reveals the descriptive statistics' results of the pretest and post-test for reading autonomy administered to both the experimental and control groups before and after the treatment. In comparison to the mean scores obtained from the students' reading autonomy on the pretest, their scores on post-test of reading autonomy increased in both groups; however, the increase in the mean scores of the control group was small. That is to say, the experimental group performed better than the control group based on the mean scores of the two groups.

Table 5. Descriptive statistics of reading autonomy						
Group	**Test**	**N**	**Mean**	**SD**	**Min**	**Max**
Experimental	Pretest	18	115.55	13.49	91	138
	Post-test		119.22	12.09	100	142
Control	Pretest	15	116.46	12.46	97	134
	Post-test		116.60	12.02	95	133

Table 5 shows that the difference in the mean scores between the experimental and control groups was small in the pretest; however, this difference was a bit large in the post-test. As a result to determine the significance of this difference, inferential statistical analysis, that is, independent samples t-test was conducted before and after the treatment.

Independent samples t-test offered two lines as displayed by Table 6. With reference to the table, since the sig. value was larger than .05, the first line was followed which referred to equal variances assumed. That is to say, since in this table the significance value was .97 which was larger than .05, the first line was used to report findings.

Table 6. Independent samples *t*-test for pretest of reading autonomy										
	Levene's test for equality of variances	**t-Test for equality of means**								
		F	**Sig.**	**t**	**df**	**Sig. (two-tailed)**	**Mean difference**	**Std. error difference**	**95% Confidence interval of the difference**	
									Lower	**Upper**
Pretest of autonomy	Equal variances assumed	.00	.97	−.20	31	.84	−.91	4.55	−10.20	8.38
	Equal variances not assumed			−.20	30.6	.84	−91	4.52	−10.14	8.32

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To figure out if there was a significant difference between the two groups, the column labelled sig. (two-tailed) was checked. Since the sig. (two-tailed) value in Table 6 was more than .05 which was .84, then there was not a significant difference in the mean scores on the dependent variable for each of the two groups before the treatment phase.

Independent samples *t*-test offered two lines as displayed by Table 7. With reference to the table, since the sig. value was larger than .05, the first line was followed which referred to equal variances assumed. That is to say, since in this table the significance value was .78 which was larger than .05, the first line was used to report findings.

Table 7. Independent samples *t*-test for post-test of reading autonomy										
		Levene's test for equality of variances		t-Test for equality of means						
		F	Sig.	*t*	df	Sig. (two-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Post-test of reading autonomy	Equal variances assumed	.07	.78	.62	31	.53	2.62	4.21	−5.97	11.22
	Equal variances not assumed			.62	29	.53	2.62	4.21	−5.98	11.23

To discover if there was a significant difference between the two groups, the column labelled sig. (two-tailed) was checked. The results of *t*-test in Table 7 reveal that the sig. (two-tailed) value was more than .05 which was .53; therefore, there was not a significant difference in the mean scores on students' reading autonomy for each of the two groups. On the other hand, the *t*-obtained value in table was .62 which was less than the critical value of .975; therefore, there was not a significant difference in the reading autonomy for each of the two groups. Thus, it can be implied that both groups did not have a considerable development in their reading autonomy after the treatment phase. Therefore, the finding does not support the idea proposed by Kumaravadivelu (2003) stating that to be independent of teachers in academic settings, learners need to have a metacognitive awareness of strategies and positive attitude towards learning to use strategies appropriately and confidently. Moreover, the promotion of learners' autonomy in an EAP course needs having a basic understanding of the language course to grasp the appropriateness of the course, and students need to be aware of their academic goals and get familiar with strategies considered essential so that they can set their own decisions regarding texts and achieve their own academic aims (Jamil, 2010). Although in previous studies it has been emphasised the development of reading autonomy focussing reading strategies instruction in EAP contexts, low performance of students in EAP reading autonomy by the data derived from the questionnaire contradicted this claim. This might be due to the paucity of questions related to these areas on the questionnaire. Additionally, a number of questions in the questionnaire such as giving rewards for making progress in work and using spare time to organize work seemed to be inappropriate in this context and show the need to take account of culture in learning strategies, using strategies and research in reading in general. However, the researcher used the questionnaire because it was reliable when she conducted its reliability analysis and as stated by Boynton and Greenhalgh (2004), "reliable questionnaires yield consistent results from different researchers over time and differences in results come from differences between participants, not from inconsistencies in how the items are designed or how different observers interpret the responses" (p. 1313).

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4.3. The interaction between reading performance and reading autonomy

As for the third research question of the study concerning the international effect of strategy-based instruction on the relationship between reading performance and reading autonomy, the researcher performed MANOVA and the results are reported as follows:

To test multivariate normality, Mahalanobis distance was calculated using regression menu. To decide whether a case was an outlier, the Mahalanobis distance value was compared against a critical value. Since the number of dependent variables was 2, the critical value was 13.82, based on the critical value suggested by Tabachnick and Fidell (2001). If an individual's Mahalanobis score exceeds this value, it is considered an outlier. The maximum and minimum values obtained in Table 8 were 5.57 and .077 for the Mahalanobis distance and since no one had values higher than the critical value of 13.82, then there was no "multivariate outlier". Therefore, the researcher safely had assumed that there were no substantial multivariate outliers and proceeded to check other assumptions.

Table 8. Residuals statistics[a] for multivariate normality					
	Minimum	Maximum	Mean	Std. deviation	N
Predicted value	−2.4480	32.0337	17.0000	8.40145	33
Std. predicted value	−2.315	1.789	.000	1.000	33
Standard error of predicted value	.894	2.236	1.441	.388	33
Adjusted predicted value	−3.3350	32.0912	16.9479	8.48777	33
Residual	−9.91814	10.14516	.00000	4.78703	33
Std. residual	−2.006	2.052	.000	.968	33
Stud. residual	−2.040	2.088	.005	1.007	33
Deleted residual	−10.25356	10.50768	.05211	5.18670	33
Stud. deleted residual	−2.161	2.221	.006	1.040	33
Mahal. distance	.077	5.578	1.939	1.584	33
Cook's distance	.000	.189	.028	.039	33
Centred leverage value	.002	.174	.061	.049	33

[a]Dependent variable: ID.

The output box labelled Box's test of equality of variance covariance informs if the data violate the assumption of homogeneity of variance covariance matrices. If the sig. value is larger than .001, then there is no violation.

Table 9. Box's test of equality of covariance matrices[a]	
Box's *M*	.946
F	.293
df1	3
df2	899,337.230
Sig.	.830

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
[a]Design: Intercept + group.

As seen in Table 9, the sig. value was .830; therefore, there was no violation of the assumption of homogeneity of variance covariance matrices because the sig. value was larger than .001.

The next box to look at was Levene's test of equality of error variances. If the sig. value for each of the variables is less than .05, then this indicates that the assumption of equality of variance for that variable is violated.

Table 10. Levene's test of equality of error variances[a]				
	F	df1	df2	Sig.
Post-test of reading	.775	1	31	.385
Post-test of autonomy	.074	1	31	.787

Tests the null hypothesis that the error variances of the dependent variables are equal across groups.
[a]Design: Intercept + group.

As displayed in Table 10, none of the variables recorded significance values less than .05; therefore, the assumption of equality of variances was not violated.

There are a number of statistics to choose from (Wilks' lambda, Hotelling's trace, Pillai's trace) to show significant differences among the groups on a linear combination of the dependent variables. However, if the data have problems (small sample size, unequal *N* values, violation of assumptions), then Pillai's trace is more robust (see Tabachnick & Fidell, 2001, p. 348). Since the sample size in this study was assumed to be small, the researcher opted for Pillai's statistics in the second section of the multivariate tests table, labelled group. As observed in Table 11, the value obtained for Pillai's trace was .651 and the significance level was .00. Therefore, it is concluded that there was a difference between the first group and the second group since the significance level was less than .05. What this means is that the effect size was .651 that was a large effect size, based on Cohen's (1992) guidelines.

Table 11. Multivariate tests[a] for differences between the two groups							
Effect		Value	*F*	Hypothesis df	Error df	Sig.	Partial eta squared
Intercept	Pillai's trace	.998	6,237.889[b]	2.000	30.000	.000	.998
	Wilks' lambda	.002	6,237.889[b]	2.000	30.000	.000	.998
	Hotelling's trace	415.859	6,237.889[b]	2.000	30.000	.000	.998
	Roy's largest root	415.859	6,237.889[b]	2.000	30.000	.000	.998
Group	Pillai's trace	.651	28.010[b]	2.000	30.000	.000	.651
	Wilks' lambda	.349	28.010[b]	2.000	30.000	.000	.651
	Hotelling's trace	1.867	28.010[b]	2.000	30.000	.000	.651
	Roy's largest root	1.867	28.010[b]	2.000	30.000	.000	.651

[a]Design: Intercept + group.
[b]Exact statistic.

To show whether the first or second group differed on the two dependent variables or both, tests of between-subject effects were used. Because the researcher was looking at a number of separate analyses here, she set a higher alpha level to reduce the chance of Type I error (i.e., finding a significant result when there is not really one). The most common way of doing this is to apply what is known as a Bonferroni adjustment. In its simplest form, this involves dividing the original alpha level of .05 by the number of analyses that is intended to do. In this study, there were two dependent variables to investigate; therefore, the researcher divided .05 by 2, giving a new alpha level of .025. The result is significant only if the probability value (sig.) is less than .025. As displayed by Table 12, only one of the dependent variables (scores obtained from post-test of reading performance) recorded a significance value less than our cutoff (with a sig. value of .00). Therefore, in this study, the only significant difference between the two groups was in their scores on reading performance, that is, their performance in reading comprehension was considerably better. In this way, the findings of the study pave the way for the acknowledgement of the importance of a strategic repertoire which is a plausible reason for putting emphasis on instruction of both L1 and L2 reading so that L2 learners in EAP contexts can master reading strategies they need for interacting successfully in academic texts (Carrell & Carson, 1997).

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Table 12. Tests of between-subjects effects							
Source	**Dependent variable**	**Type III sum of squares**	**df**	**Mean square**	**F**	**Sig.**	**Partial eta squared**
Corrected model	Post-test of reading	278.409[a]	1	278.409	56.104	.000	.644
	Post-test of autonomy	56.259[b]	1	56.259	.387	.539	.012
Intercept	Post-test of reading	43,005.682	1	43,005.682	8,666.367	.000	.996
	Post-test of autonomy	455,008.259	1	455,008.259	3,127.058	.000	.990
Group	Post-test of reading	278.409	1	278.409	56.104	.000	.644
	Post-test of autonomy	56.259	1	56.259	.387	.539	.012
Error	Post-test of reading	153.833	31	4.962			
	Post-test of autonomy	4,510.711	31	145.507			
Total	Post-test of reading	44,433.000	33				
	Post-test of autonomy	464,295.000	33				
Corrected Total	Post-test of reading	432.242	32				
	Post-test of autonomy	4,566.970	32				

[a]R squared = .644 (adjusted R squared = .633).
[b]R squared = .012 (adjusted R squared = −.020).

5. Conclusion

The findings from this study indicate that EAP students made progress in reading comprehension through reading strategies instruction; thus, it can be inferred that when teachers teach reading strategies to students, they seem to be conscious of the strategies and techniques which help them comprehend the reading texts more effectively and the passage can be considered as a whole unit in which understanding of the parts is determined by the preceding and succeeding sections of the text. Therefore, some Iranian undergraduates' deficiencies in EAP reading comprehension are remunerated using strategy-based approach proposed in the present study. On the other hand, the findings of the study show that improvement and development in learner autonomy through strategy-based instruction as a learner-based approach were not satisfactory and strategy-based instruction did not significantly affect students' learning results. Based on the findings of the present study, it deserves mention that teachers need sufficient time for teaching specific reading skills and prompting content reading with the purpose of preparing students to read autonomously. Moreover, most of the students have a background in teacher-centred learning in EFL situations where it is expected that grammar-translation method in EFL classrooms leads students to learn quickly. However, teachers need to spend more time and attempt on teaching strategies in order to prepare, process and monitor the instruction. Therefore, students are in need of sufficient assistance with the aim of varying their status from relying on the teacher to the state of being self-reliant in the target language reading which is in accord with principles underlying the learning focussed instructional strategies.

This study makes important contributions to curriculum developers, syllabus designers, teachers and students who aim to develop present situation of EAP learning in higher education settings.

Therefore, the results of the study can be applied for the current EAP teachers with the purpose of renewing and updating their methodological policies and alternatives in the light of students' reading comprehension needs and lacks instead of syllabus designers' ideal goals.

This study includes some limitations that need to be mentioned. First, it has only used the limited participants from a single university, and future research should include testing participants at different universities or in high schools throughout the country. Second, the focus of the intervention in this study was merely on the reading skill. As a result, further research projects could be conducted about the effect of strategy-based instruction on other language areas such as speaking, listening and writing.

Competing interests
The authors of the present study have been involved in teaching EAP courses through reading strategies for several years. They have been interested in such areas of research as language learning strategies, learner autonomy in EAP contexts, teacher education, teaching language skills, as well as teaching reading strategies. With this research interest in mind, the authors of the current study intended to figure out how reading strategies instruction affects EAP students' reading performance and reading autonomy more than the traditional mode of language instruction. This great concern provoked them to conduct the present study, hoping that the findings would have pedagogical implications for language learners, teachers, and in a wider scope language educators and practitioners.

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