Effect of strategy based instruction on achievement test scores in a mixed language ability group of ESP learners

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Abstract

The present article reports on the findings of a study that explored the effect of explicit strategy based instruction on achievement test scores in mixed language ability groups within an ESP course in a higher education setting. The research results indicate that language learner strategy instruction, which focused on cognitive, metacognitive and memory strategies, did not have any effect on achievement test scores among students with a higher level of general language competence. The results also indicate that membership in the experimental group was not a positive predictor of scores on vocabulary tasks of the achievement test among students with lower levels of pre-existing language ability. The results, discussed with respect to the context in which strategy based instruction was conducted, bring into question the justification for explicit strategy based instruction in mixed language ability groups, emphasize the importance of metacognitive awareness, and suggest that when insufficient time is available for integrated strategy instruction, a separate and independent module on learner strategies, focusing on different strategies for students at different levels of language competence, or implicit language learner strategy instruction seem to be more appropriate.

Keywords: higher education, language competence, achievement test score, language learner strategy instruction, mixed language ability group.

Resumen

Efectos de la instrucción basada en estrategias sobre las puntuaciones en pruebas de logros alcanzados en un grupo de estudiantes de IFE con capacidades lingüísticas heterogéneas

El presente artículo informa sobre las conclusiones de un estudio que exploró el efecto de la enseñanza explícita de estrategias sobre los resultados de pruebas de logros alcanzados en grupos de estudiantes con capacidades lingüísticas heterogéneas dentro de un curso de IFE en el ámbito de la enseñanza superior. Los resultados de la investigación demostraron que la enseñanza de lenguas basada en la instrucción de estrategias, centrada en estrategias cognitivas, metacognitivas y de memoria, no ha repercutido sobre los resultados de la prueba de rendimiento entre los estudiantes con un nivel más alto de competencia lingüística general. Los resultados demostraron, además, que participar en un grupo experimental no conlleva un índice positivo de resultados en tareas de vocabulario en la prueba de rendimiento entre los estudiantes con un nivel más bajo de competencia lingüística. Los resultados obtenidos, analizados en cuanto al contexto en el cual se llevó a cabo la instrucción basada en estrategias, cuestionan la idoneidad de la enseñanza explícita de estrategias en grupos de capacidades lingüísticas heterogéneas, enfatizan la importancia de los conocimientos metacognitivos, y sugieren que, en caso de que el tiempo disponible para la instrucción integrada de estrategias no sea suficiente, parece más apropiado implantar un módulo separado e independiente de estrategias de aprendizaje que se centre en estrategias diferentes para estudiantes en los distintos niveles de competencia de la lengua.

Palabras clave: enseñanza superior, competencia lingüística, resultado de prueba de logros alcanzados, enseñanza de estrategias de aprendizaje de lenguas, grupos de capacidades lingüísticas heterogéneas.

1. Introduction

An important goal of tertiary education has become learning-how-to-learn instead of simple transmission of factual information (Wong & Nunan, 2011) and to teach students how to learn and think independently (Vermunt, 1996). Moreover, poor use of learner strategies has been identified as one of the most important problems students have to cope with after entering higher education (Marentič Požarnik & Mihevc, 1997). Hence, in circumstances when needs analysis has revealed that in their probable future careers a high level of language competence will be required (Jurkovič, 2002), we need to look for classroom interventions that might allow less successful students to catch up with their peers and students at higher levels of language competence to become (more) successful lifelong learners (Jurkovič, 2007). A possible classroom intervention aiming at enhancing these processes is the explicit introduction of learner strategies into the process of language teaching.

Essentially for this study, due to scheduling and financial constraints, division of students into groups based on pre-existing language ability was not feasible. Therefore, this article addresses the question whether explicit strategy based instruction across all strategy groups contributes to better language achievement test scores in an ESP higher education setting in mixed language ability groups.

1.1. Theoretical framework

In more than three decades of research into language learner strategies a mass of competing definitions of what they are has been developed. Macaro (2006), for instance, suggests that learner strategies should be described in terms of these essential features: their origins in working memory, conscious mental activity that learners employ to pursue a goal in a given learning situation, and transferability. Nevertheless, a consensus regarding all elements that are necessary for learning behaviours to be considered strategies has not still been reached. This concerns in particular the employed level of consciousness, explicitness regarding action, degree of goal orientation, strategy size, and potential for leading to learning (Cohen, 2007).

Along with a number of definitions, several taxonomies of language learner strategies have been produced (Rubin, 1981; Oxford, 1990 & 2011; Chamot & O'Malley, 1994; Macaro, 2006; Fazeli, 2011; among others). Among the most influential ones certainly is that proposed by Oxford (1990), which is supported by a strategy use questionnaire and results in numerous research studies. According to the classification developed by Oxford in 1990 (for a different and upgraded taxonomy proposed by the same author see Oxford, 2011), there are six groups of language learner strategies. "Memory strategies" help students store and retrieve new information, "cognitive strategies" enable learners to understand and produce language, "compensation strategies" allow learners to use the language despite knowledge gaps, "metacognitive strategies" allow learners to coordinate and regulate their own learning process, "affective strategies" help them to regulate their affect, and "social strategies" help students to learn through interaction with peers or other speakers of the foreign language.

Similarly, a variety of language learner strategy instruction models has been developed (Chamot & O'Malley, 1994; Cohen, 1998; Grenfell & Harris, 1999; Oxford, 2011). According to Hassan et al. (2004: 5), language learner strategy instruction focuses on the strategies "regularly to be adopted and deployed by learners in order to develop language proficiency, improve language task achievement or both." Despite differences that distinguish one instruction model from another, they share a number of features (Harris, 2003; Chamot, 2004). These are the importance of students' current learner strategies, choice of appropriate tasks for practicing strategies, importance of developing metacognitive awareness of the learning process, and strategy instruction that is explicit and integrated into regular course activities. Chamot (2008), however, emphasizes that implicit instruction can also be powerful.

The training model used in the present research study was the cognitive academic language learning approach (CALLA), developed by Chamot and O'Malley (1994) while the strategies that were explicitly introduced into the teaching process were selected from Oxford's (1990) taxonomy. The main reason for this choice is the availability, psychometric data and widespread use of the questionnaire Strategy Inventory for Language Learning (or SILL, for short) (Oxford, 1990).

The CALLA model was selected for several reasons. The first one is that it includes three components: study-discipline content, academic language skills, and explicit scaffolded instruction in language learner strategies, among which the first two are inherent to any ESP course in a higher education setting. Moreover, the model is grounded in theory and practice, so that it explains how something is learned and provides guidelines for instruction. Explicit strategy based instruction following the CALLA model consists of recursive phases (Chamot & O'Malley, 1994; Chamot et al., 1999). During the preparation phase prior knowledge of students in relation to a specific language learner strategy is identified and/or discussed. The second phase is presentation when a new language learner strategy is presented and its use demonstrated and modelled. Next, during the third phase (practice) the strategy is practised using the usual classroom material. The fourth phase consists of evaluation when students assess how well the strategy is helping them. The final or fifth phase is expansion or students' attempt to transfer the examined language learner strategy or cluster of strategies to new tasks.

It has been suggested that language learner strategy instruction may help learners in manifold ways. They learn about their own process of learning, see the effect of strategy use on learning efficiency, raise metacognitive awareness of their learning process, and become more autonomous learners

(Chamot & O'Malley, 1994). However, research shows that not all strategy training studies in language classrooms have been successful or conclusive (Plonsky, 2011; Wong & Nunan, 2011). In a meta-analysis on the effectiveness of strategy based instruction, Plonsky (2011) concluded that the magnitude of strategy based instruction can be described as having a small to medium effect and is "modest when compared to other bodies of L2 research that have undergone meta-analysis" (Plonsky, 2011: 1013). Nevertheless, it seems that all interventions that focused on metacognitive strategies yielded positive results (Sengupta, 2000; Kusiak, 2001; Rasekh and Ranjbary, 2003; Graham & Macaro, 2008). Importantly for this study, Plonsky (2011) also reports that higher proficiency students are more likely to benefit from strategy based instruction than lower-proficiency students. An interesting five-year study was conducted by Taylor et al. (2011): tutoring in language learner strategies and study skills, in addition to regular language classes, was provided to struggling students and the results indicated that most of these students, despite significant assistance, dropped out of the English language program and thus failed the course.

Most studies have focused on the effect of training in the use of one strategy or one group of strategies on a single language skill or element, mostly vocabulary (Lawson & Hogben, 1998; Atay & Ozbulgan, 2007). Importantly for this article, no study reports results of strategy based instruction in mixed language ability groups in a higher education ESP setting. In studies where the language competence level of participants is stated, it is described loosely (that is, intermediate, lower intermediate, poor), which does not provide accurate data but does indicate that the groups were homogeneous in terms of pre-existing language ability.

2. Method

2.1. Participants

The participants in the study were seventy-seven full-time first year students, aged between 18 and 24 (mean: 19.94), attending classes of English as a foreign language for students of traffic technology and transport logistics at the Faculty of Maritime Studies and Transport (University of Ljubljana, Slovenia) from October 2007 through May 2008. Twenty-nine participants were female and forty-eight participants were male.

The participants attended the English course in three groups (22 students in the first group, 34 in the second, and 21 in the third). No other courses at our faculty use English as the medium of instruction, which means that students were not exposed to any additional English input in the formal instructional setting.

The first two groups were randomly selected to make part of the experimental group (group A with a total of 56 students). The contrast group (group B) thus consisted of 21 students. A background questionnaire was used to determine similarities and differences between the experimental and contrast groups in relation to age of participants, type of secondary school they had completed, secondary school cumulative grade point average, and secondary school English language grade. T-tests indicated no significant differences on any of these characteristics between the two groups.

2.2. Setting

The Faculty of Maritime Studies and Transport is a member of the University of Ljubljana, Slovenia. Only one foreign language (English) is taught at the faculty. When this study was conducted, the language course covered ninety hours (thirty three-hour weekly sessions) in the first year of studies and ninety hours in the second year. The learning objectives of the language course in the first year, which the present study is related to, included the development of the reading skill (understanding technical and semi-technical texts), the acquisition of technical and semi-technical vocabulary in relation to traffic technology and transport logistics, the revision of essential grammatical structures, and the improvement of writing, speaking, and listening skills related to transport logistics and traffic technology. The language competence level that all students were expected to reach by the end of the first year of studies was set at B1+/B2 of the Common European Framework of Reference for languages (CEFR) (Council of Europe, 2001).

2.3. Instruments and data collection procedures

Data for the present study were collected by means of two instruments: the Oxford Placement Test (OPT) and an achievement test.

(1) The OPT (Allan, 2004) was used to establish differences among students in terms of language ability at the beginning and end of

the language course. A significant advantage of the OPT is that it has been calibrated against a series of international language examinations and levels, including those of the CEFR, and its time-efficiency when detailed data in relation to language competence in each language skill and element is not essential. The test is divided into two main sections. The first one mostly aims at the testing of reading, listening, and vocabulary size while the second section is a test of grammar, vocabulary, and reading skills.

(2) An achievement test, prepared by the teacher, was used at the end of the language course to assess the level to which students met the instructional objectives. In accordance with these objectives (see section 2.2.), the difficulty level of test tasks ranged between B1 and B2. The achievement test contained four tasks, each consisting of twenty items and contributing one quarter to the final score. For each correct item one point was given, thus totalling a maximum of 80 points. The first task aimed at the testing of reading comprehension, and technical and semi-technical vocabulary discussed during the language course and extracted from the course book. It consisted of a gap-fill task. The difficulty level of this task was assessed to be at level B2. The second task aimed at the testing of reading comprehension. Based on a text of approximately one page and a half in length, students had to decide whether the given statements were true, false or not given. The difficulty level of the second task was assessed to be at level between B1 and B2 (henceforth, B1/B2). Similarly to the first task, the third task aimed at the testing of technical and semi-technical lexical knowledge and reading comprehension in the form of a word formation gap fill task. The level of difficulty of this task was assessed to be at level B1/B2. The lexical items needed to fill in the gaps in the sentences were extracted from the course book. Finally, task four of the achievement test consisted of a multiple choice grammar task, which aimed at the testing of grammatical structures such as active and passive tense forms, comparison of adjectives, demonstrative pronouns, prepositions, and conjunctions. All grammatical structures tested by task four had been revised during the language course. The difficulty level of this task was assessed to be at level B1. Writing was assessed throughout the language course through the use of obligatory

writing homework assignments while speaking was assessed at the oral part of the final exam, which is why these two skills were not included in the achievement test score.

2.4. Data analysis

The Statistical Package for the Social Sciences (SPSS 13.0) was employed to process the data obtained in the study. "Regression analysis allows scientists to quantify how the average of one variable systematically varies according to the levels of another variable" (Gordon, 2010: 6) while independent sample t-test or One-Way ANOVA do not provide information on effect size nor allow the inclusion of a moderator variable. As a result, regression analysis was the major analysis used for the examination of the relationship between membership in the experimental group and achievement test scores. A sample required for testing regression coefficients should include at least twenty times as many cases as independent variables, or to have $n \geq 50 + 8*m$ (m refers to the number of independent variables) for testing R-square (Tabachnick & Fidell, 2001). Despite being modest in size, the sample of seventy-seven participants meets both requirements.

3. Materials and instruction

The course book *Routes to Traffic English* (Jurkovič & Harsch, 2004) that was used in class had been written on the basis of results of a needs analysis conducted among graduates of our faculty (Jurkovič, 2002). It focuses on topics related to the four main modes of transport (road, rail, sea, and air transport). In accordance with instructional objectives, the language level of most tasks in the course book is set at level B1+/B2.

Both groups received the usual language training. In addition to language training the experimental group received explicit "completely informed strategy instruction" (Oxford, 2011: 181) whereas in the contrast group language learner strategies were implicitly embedded in instructions to language tasks but not explicitly discussed – "blind [covert] strategy instruction", as defined by Oxford (2011: 181). Explicit strategy based instruction continued throughout the instruction period of thirty weeks. Language activities in the experimental group were interrupted twice to thrice per session for approximately five to ten minutes to discuss the relevant strategies or clusters that were incorporated into regular teaching materials. The total time dedicated to explicit strategy based instruction can thus be estimated at approximately fifteen to twenty minutes per session. Instruction was scaffolded, which means that at an initial stage the strategies were thoroughly presented, discussed, practised and evaluated while at a later stage students were reminded of their use through instructions. Therefore, the essential distinctive difference between the experimental and contrast groups was that the experimental group was systematically and explicitly introduced to language learner strategies.

The main principle that determined the selection of learner strategies that were integrated into regular course activities was that they should be matched to course objectives and tasks. Given that interacting cognitive and metacognitive processes constitute the language learning or language use processes (Macaro, 2006), the majority of the language learner strategies incorporated into the training model were cognitive strategies. In order to raise metacognitive awareness of and enable reflection upon the learning process and efficiency of learner strategies, emphasis was also put on metacognitive strategies. The third group of strategies that instruction focused on, with the primary aim to enhance the acquisition of technical and semi-technical vocabulary, was memory strategies. The current study recognises the key importance of the affective domain in the language learning process and learner strategy use (Krashen, 1985; Chamot et al., 1999; Ushioda, 2008; among others). Motivation and other aspects of affect were stimulated through the creation of a positive class atmosphere, setting of clear learning objectives, positive feedback, and individualized approach to students. These, however, were not explicitly discussed following the steps of the instructional model.

4. Results

Descriptive statistics for OPT scores at the beginning (October, 2007) and end of the language course (May, 2008) are presented in Table 1: number of participants, mean, standard deviation, coefficients of skewness and kurtosis.

	n	M	SD	Skewness	Kurtosis
October 2007	77	125.90	13.953	0.174	-0.145
May 2008	77	131.49	13.550	-0.144	0.046

Table 1. Descriptive statistics for OPT scores at the beginning and end of the language course.

Data in Table 1 show that at the end of the language course students improved their mean OPT scores by almost six points. Standard deviation values for test scores at the beginning and end of the language course were almost the same. The coefficients of skewness and kurtosis indicate normal distribution of variables derived from OPT scores.

Pearson's coefficient of correlation was used to calculate test-retest reliability. Its value (at 0.702) indicates a high level of test-retest reliability. Internal consistency reliability of the OPT was confirmed using Cronbach's alpha test (0.825). Criterion-related validity of OPT scores was determined through the calculation of Spearman's rank correlation coefficient. The values of Spearman's coefficient, significant at the level p=0.000, have shown a positive and marginally strong correlation between CEFR levels derived from both instruments at the beginning (0.505) and end of the language course (0.546). Finally, the predictive validity of the OPT has been confirmed by regression analysis. The results have shown that OPT scores at the beginning of the language course can explain 29% of the variance in achievement test scores (R^2=0.294, p=0.000, b=0.542) while OPT scores at the end of the language course can explain almost 24% of the variance in achievement test scores (R^2=0.238, p=0.000, b=0.487).

Descriptive statistics for achievement test scores are presented in Table 2: mean, standard deviation, coefficients of skewness and kurtosis as a whole and for separate achievement test tasks.

	n	M	SD	Skewness	Kurtosis
Task 1 – Vocabulary	77	66.7	20.276	-0.619	-0.401
Task 2 – Reading	77	68.7	9.104	-0.438	0.430
Task 3 – Word formation	77	51.5	21.402	-0.421	-0.460
Task 4 – Grammar	77	62.5	13.938	0.299	-0.444
Achievement test	77	62.6	12.466	-0.332	0.124

Table 2. Descriptive statistics for achievement test scores.

Data presented in Table 2 show that the mean achievement test score was at almost 63%. The scores at all tasks, with the exception of task three, where the mean score was significantly lower, are above (tasks one and two) or almost equal to the mean test score (task four). Standard deviation values show highest dispersion of values for tasks one and three, both aiming at the testing of technical and semi-technical vocabulary and reading comprehension. The coefficients of skewness and kurtosis indicate relatively normal distribution of variables derived from achievement test scores. In no case the values of the coefficients of skewness and kurtosis are higher than ±1.0 and therefore no variable was excluded from the analysis.

The achievement test had been piloted on forty-four students who had attended the same language course in the academic year 2004-2005. In order to calculate test-retest reliability, independent samples t-test was used to identify differences between test scores at the achievement test taken in May, 2008, and the same test taken by a different cohort of students in June, 2005. No statistically significant differences were found between these scores (p=0.682; t=0.411).

Internal consistency reliability of the achievement test was confirmed using Cronbach's alpha test (0.751). Internal validity was calculated using principal components analysis. It (no rotation) showed high loadings of all four items on a single factor (0.864 for task one, 0.802 for task two, 0.772 for task three, and 0.607 for task four). Content validity of the achievement test was confirmed by the degree to which test tasks matched the instructional objectives (see section 2.2). In addition, the language competence level that students were expected to reach by the end of the first year of their studies was set at B1+/B2, which matched the average difficulty level of the achievement test.

It was shown that a significant portion of the variance in achievement test scores can be predicted through OPT scores (29% by OPT scores at the beginning or 24% at the end of the language course). This indicates that membership in the experimental group (or, in other words, explicit strategy based instruction as the key feature distinguishing the experimental from the contrast group) could not be considered as the only predictor of achievement test scores.

Regression analysis was first performed to determine the effect of membership in the experimental group, included in the regression model as a dichotomized variable, on achievement test scores. Given that OPT scores are a valid predictor of achievement scores, OPT scores at the beginning of the language course were included in the regression model as an independent moderator variable. The dependent variables included in five separate regression models (ENTER method) were:

- "Task 1 – Vocabulary", reflecting the score on task one;
- "Task 2 – Reading", reflecting the score on task two;
- "Task 3 – Word formation", reflecting the score on task three;

- "Task 4 – Grammar", reflecting the score on task four; and
- "Achievement test", reflecting the overall achievement test score.

Regression analysis results are presented in Table 3.

Task type & test		Unstand. coeff. B	Std. error	Std. coeff. Beta	t	Sig.
Task 1 – Vocabulary	(Constant)	-8.886	21.045		-0.422	0.674
	Group A	-11.770	4.656	-0.252	-2.399	0.019
	OPT score	0.657	0.163	0.423	4.025	0.000
Task 2 – Reading	(Constant)	45.912	10.900		4.550	0.000
	Group A	-4.389	2.232	-0.221	-1.966	0.053
	OPT score	0.204	0.078	0.292	2.603	0.011
Task 3 – Word formation	(Constant)	-25.565	21.432		-1.193	0.237
	Group A	-15.992	4.742	-0.342	-3.372	0.001
	OPT score	0.696	0.166	0.424	4.183	0.000
Task 4 – Grammar	(Constant)	-8.627	13.943		-0.619	0.538
	Group A	-2.345	3.085	-0.077	-0.760	0.450
	OPT score	0.573	0.108	0.537	5.298	0.000
Achievement test scores	(Constant)	1.842	11.621		0.158	0.875
	Group A	-8.239	2.571	-0.303	-3.204	0.002
	OPT score	0.524	0.090	0.549	5.811	0.000

Table 3. Effect of membership in the experimental group (A) and OPT scores at the beginning of the language course (October 2007) on the different tasks and achievement test scores (N=77, R^2=0.238, Sig.=0.000).

Data presented in Table 3 indicate that membership in the experimental group was a statistically significant negative predictor of achievement test scores on the test as a whole and on tasks one and three, both aiming at the testing of technical and semi-technical vocabulary and reading comprehension. In addition, it was shown that OPT scores are a statistically significant positive predictor of achievement test scores, indicating that students with higher OPT scores outperformed students with lower OPT scores on the achievement test.

To find out if students from the contrast group achieved better OPT scores at the beginning and end of the language course, which might have determined the results presented in Table 3, independent samples t-test was performed. At the level below 0.05 set for the study, the test did not reveal any statistically significant differences between the experimental and contrast groups in terms of OPT scores at the beginning (p=0.761, t=-0.306) and end of the language course (p=994, t=0.008), which was also confirmed by the general linear model - repeated measures (p=0.711, F=0.139). Descriptive statistics are presented in Table 4.

		n	M	SD	Range	Min	Max
October 2007	Group A	56	125.63	14.751	63	94	157
	Group B	21	126.62	11.859	43	110	153
May 2008	Group A	56	131.50	14.722	65	97	162
	Group B	21	131.48	10.083	41	110	151

Table 4. Descriptive statistics: OPT scores in the experimental (A) and contrast (B) groups.

A comparison between the experimental (A) and contrast (B) groups revealed that mean OPT scores in both groups at the beginning and end of the language course were very similar. Standard deviation values, however, indicate a greater dispersion of values in group A than in group B, indicating a higher level of mixed language ability in this group. This assumption was confirmed by the wider range of values in the experimental group than in the contrast group.

These results indicate that differences among students in terms of pre-existing language ability were higher in the experimental than in the contrast group. In order to minimize the effect of pre-existing language ability, achievement test scores of students with higher OPT scores from group A had to be compared against achievement test scores of students with higher OPT scores from group B, and vice versa.

Hierarchical clustering was first used to determine the number of groups that students should be divided into, depending on OPT scores at the beginning of the language course. The dendrogram using Ward's method showed that students should be divided into two groups, which were labelled as "high-level group" and "low-level group". K-means clustering was then used. Final cluster centres and the percentages of students in each cluster are presented in Table 5.

	Cluster 1 (high-level group)	Cluster 2 (low-level group)
Final cluster centres	139 pts	116 pts
All students	43%	57%
Group A	41%	59%
Group B	50%	50%

Table 5. Results of K-means clustering.

Regression analysis with the same dependent variables was performed again. The effect of OPT scores was minimised by the division of students into groups and therefore membership in the experimental group was the only independent variable included in the model. Because of limited sample size, the testing of R-square values is not reliable (see section 2.4.) and no moderator variable was included in the analysis, which means that these data only have an indicative value. Regression analysis results are first presented for the high-level group (Table 6).

Task type & test		Unstand. coeff. B	Std. error	Std. coeff. Beta	t	Sig.
Task 1 –	(Constant)	78.100	5.381		14.515	0.000
Vocabulary	Group A	-2.782	6.489	-0.078	-0.429	0.671
Task 2 –	(Constant)	71.300	2.262		31.520	0.000
Reading	Group A	-1.255	2.728	-0.084	-0.460	0.649
Task 3 – Word	(Constant)	66.700	5.285		12.619	0.000
formation	Group A	-10.382	6.375	-0.285	-1.629	0.114
Task 4 –	(Constant)	70.300	3.542		19.846	0.000
Grammar	Group A	-0.027	4.272	-0.001	-0.006	0.995
Achievement test	(Constant)	71.600	3.105		23.059	0.000
scores	Group A	-3.600	3.745	-0.173	-0.961	0.344

Table 6. Effect of membership in the experimental group (A) on tasks 1-4 and achievement test scores in the high-level group (N=77, R^2=-0.002, Sig.=0.344).

These results indicate that membership in the experimental group did not have any statistically significant effect on achievement test scores among high-level students. Table 7 presents regression analysis results for the low-level group.

Task type & test		Unstand. coeff. B	Std. error	Std. coeff. Beta	t	Sig.
Task 1 –	(Constant)	70.909	5.613		12.634	0.000
Vocabulary	Group A	-16.254	6.592	-0.371	-2.466	0.018
Task 2 –	(Constant)	72.091	3.022		23.859	0.000
Reading	Group A	-6.608	3.549	-0.289	-1.862	0.070
Task 3 – Word	(Constant)	58.727	6.343		9.259	0.000
formation	Group A	-18.865	7.449	-0.380	-2.532	0.016
Task 4 –	(Constant)	58.182	3.952		14.722	0.000
Grammar	Group A	-2.527	4.641	-0.088	-0.544	0.589
Achievement test	(Constant)	65.091	3.345		19.457	0.000
scores	Group A	-10.677	3.929	-0.403	-2.718	0.010

Table 7. Effect of membership in the experimental group (A) on tasks 1-4 and achievement test scores in the low-level group (N=77, R^2=-0.141, Sig.=0.010).

The results of regression analysis presented in Table 7, on the other hand, show that low-level students from the contrast group outperformed low-level students from the experimental group on all tasks of the achievement test and the achievement test as a whole; however, the differences on tasks two and four are not statistically significant. R-square values show that 14% of the variance in achievement test scores, almost 14% of the variance in scores on task one, and slightly over 12% of the variance in scores on task three among these students can be explained by membership in the experimental group. These results suggest that membership in the experimental group, where language learner strategies had been explicitly introduced into the teaching process, did not have a positive effect on achievement test scores, in particular on scores at the two tasks aiming at the testing of technical and semi-technical vocabulary and reading comprehension.

5. Discussion

Firstly, the OPT score as an indicator of pre-existing language ability is a valid and positive predictor of achievement test scores. On the other hand, membership in the experimental group was a negative predictor of achievement test scores on the test as a whole and tasks one and three, both aiming at the testing of technical and semi-technical vocabulary. The dispersion of OPT scores in the experimental group at the beginning and end of the language course was high (higher than in the contrast group), which indicates mixed language ability in this group in particular. The minimum OPT score in this group (94 points at the beginning and 97 points at the end) corresponds to CEFR level A1. The maximum OPT score in this group, on the other hand (157 points at the beginning and 162 points at the end) corresponds to CEFR level C1. Similarly, in the contrast group CEFR levels based on OPT scores ranged from A2 to C1.

Secondly, the results have shown that explicit strategy based instruction did not have a statistically significant effect on achievement test scores among students at a higher level of pre-existing language competence. In fact, no statistically significant difference as to achievement test scores was recorded between high-level students from the experimental and contrast groups. Given the limited sample size, however, these results only have an indicative value.

Next, low-level students from the contrast group outperformed low-level students from the experimental group on two achievement test tasks that aimed at the testing of vocabulary. Therefore, in this situation explicit strategy based instruction did not have a positive effect on vocabulary learning as other studies have shown. Given that Lawson and Hogben (1998) explored the effect of a single strategy (using keywords), Rasekh and Ranjbary (2003) studied the effect of metacognitive strategy training, and Atay and Ozbulgan (2007) explored the effect of memory strategies on learning vocabulary while the language competence level is only defined in the second study (as pre-intermediate), no straightforward comparisons between these results and the results of the present study can be made. In addition, as mentioned above, the results that indicate that membership in the experimental group did not have a positive effect on the learning of technical and semi-technical vocabulary only have an indicative value because of limited sample size. Therefore, it cannot be asserted that membership in the experimental group had a negative effect on the acquisition of vocabulary but rather that acquisition of vocabulary was not positively affected by it.

Another interesting finding in relation to the two tasks that aimed at the testing of technical and semi-technical vocabulary is related to the difficulty level of these tasks (see section 2.3). Task one (at B2) and task three (at B1/B2) seem to have been the most difficult and selective tasks of the achievement test for low-level students from the experimental group in particular.

And finally, regression analysis has shown that 16% of the variance in achievement test scores, almost 14% of the variance in scores on task one, and slightly over 14% of the variance in scores on task three among students from the low-level group can be explained by membership in the experimental group. No moderator variable was included in these models but these results do indicate that, in addition to pre-existing language ability and membership in the experimental group, achievement test scores among these students were significantly influenced by other factors that contributed to a large proportion of unexplained variance and that were not addressed in this study (affective factors, for instance).

Several possible reasons for the results presented above can be identified. The first one is that students that entered higher education with lower levels of pre-existing language ability might need more time to "unlearn" (Lau & Chan, 2007: 851) their habitual (inefficient) learning patterns. In other words, as with other forms of learning procedural knowledge the shift to using new language learner strategies might initially produce poorer results and contribute to more efficient learning only later, when new strategies have been fully adopted.

Another possible reason is the amount of time dedicated to explicit strategy based instruction. Because of course time constraints this time was limited to a total of approximately five hours. As Oxford et al. (1990) pointed out, a short period of training might contribute to lack of training success. In addition, the time that was dedicated to strategy instruction was deducted from the real content of teaching or ESP skills and elements (for example, the teaching of vocabulary). Research studies have shown that in order to be effective, language learner strategy instruction has to be integrated into regular course activities and become explicit (Chamot, 2004) and that it works best when learners are given enough time to develop their use of strategies (Chamot & O'Malley, 1994). However, in circumstances where time constraints might exert a negative influence on the efficiency of such training, it would be justified to consider the organization of a separate module on (language) learner strategies (Oxford, 2011); or, as Chamot (2008) has pointed out, an alternative is implicit instruction in language learner strategies that can have equally powerful effects.

In my opinion, the primary reason why explicit strategy based instruction did not yield a positive effect on achievement test scores is the heterogeneous nature of the experimental group in terms of pre-existing language ability. Griffiths (2003), for example, found out that learners at higher levels of language competence use different and more sophisticated strategies than learners at lower levels of language competence, which means that their training needs might be different (see also Plonsky, 2011). In addition, lower-proficiency students are less independent and autonomous while being more authority-oriented in their learning than higher proficiency students (Wong & Nunan, 2011). The results of the present study can also be related to the findings of Taylor et al. (2011) that students struggling with English did not seem to have benefited from "strategic" tutoring. Moreover, in relation to the teaching of vocabulary learner strategies, Nyikos and Fan (2007) claim that the order of teaching of vocabulary learner strategies should be matched to students' skills and abilities. A question is, therefore, which students' skills and abilities the teaching of (vocabulary) learner strategies should be matched to in a mixed language ability group.

Moreover, the level of difficulty of most language tasks that learner strategies were related to might have been too high for low-level students. As mentioned in section 3, the difficulty level of most tasks in the course book is at B1+/B2 or in other words, probably too difficult for A1 or A2 students. Chamot et al. (1999) suggest that strategy instruction should be based on language tasks at an appropriate level of difficulty. Another key question thus concerns the appropriate difficulty level of language tasks in mixed language ability groups where "strategic" needs of individual learners vary considerably. A task that is far too difficult for an A1 student may be relatively easy, for instance, for a B2 student. Conversely, a task that is suitable for an A2 student, will not be challenging enough for a C1 student. It must be emphasised again, however, that due to scheduling and financial constraints division into groups based on pre-existing language ability was not feasible.

The investigation was conducted among first-year students taught by the same teacher, which produced the rather modest sample of seventy-seven participants. Therefore, the ability to generalize the data is limited. Nevertheless, the research data do indicate that explicit strategy based instruction did not have a positive effect on achievement test scores, and bring into question the rationale for the explicit introduction of language learner strategies in mixed language ability groups. Another significant limitation of the study is that no other independent variables that might have affected the results were taken into consideration (biographical data, learning style, and affective factors). Last but not least, this study examined the effects of strategy based instruction on scores at the achievement test taken immediately after the completion of the language course. This means that it fails to provide any data on possible long-term effects of strategy based instruction as it only examines immediate effects.

Future research in language learner strategy instruction in groups that are heterogeneous in terms of learners' pre-existing language ability might therefore be oriented toward the efficiency of implicit training in language strategy use. In this case three groups would be necessary: one exposed to explicit strategy based instruction, the second to implicit strategy based instruction, and the third with no strategy instruction. Secondly, in order to explore the hypothesis that students at lower levels of pre-existing language ability need more time to unlearn their previously habitual learning patterns to make their learning more efficient through the adoption of new strategies, language learner strategy use and language progress should be measured again some time after training in language learner strategy use had been completed. Finally, Engineering and Science students seem to be less effective language learners than Arts, Law or Medical students (Wong & Nunan, 2011). As a result, it would be interesting to explore whether strategy based instruction would have a positive effect in mixed language ability groups at the tertiary level of education in the field of the Arts or Humanities.

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