



The effects of deductive, inductive, and a combination of both types of grammar instruction in pre-sessional classes in higher education

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Abstract

The purpose of this paper is to investigate students' grammar performance and attitudes toward inductive and deductive approaches to teaching grammar in English. A mixed-method study in higher education tested the effectiveness of inductive, deductive, and a combination of both approaches on student performance on grammar tests using eight grammatical structures. To collect data, a quasi-experimental control group pretest-posttest design was used, which included interviews, observations, questionnaires, and diaries. As indicated by the results, there were significant differences between the grammar performances of the different groups in favour of the deductive approach. Students' grammar performance was also slightly improved when deductive grammar instruction was used or when both types were combined for university L2 students. Also, the study suggested using inductive instruction with simpler grammatical structures and deductive instruction with more complex grammatical structures. As a result, the study highlights the importance of practicing both types of instruction.

Keywords: *Deductive; grammar instruction; higher education; inductive; pre-sessional.*

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Introduction

Pre-sessional courses are designed to assist second language (L2) English speakers in preparing for courses in higher education. L2 English students preparing for undergraduate or postgraduate programs undergo intensive language training. Upon starting their programs, they must complete a language evaluation and exam, marking an important milestone in their language development. An important aspect of their preparation is that they focus heavily on grammar as it plays a crucial role in their academic success and effective communication. The mastery of grammar is particularly important in academic writing, where it is essential to communicate precisely and efficiently. Thus, mastering grammar is essential for students to produce quality work that meets academic standards in academic writing and research. This study examined the effects of three main grammar instruction approaches on pre-sessional students of English in higher education focusing on seven grammatical structures.

Teaching grammar involves two main approaches: inductive and deductive. In deductive learning, grammar rules are explained explicitly, followed by examples and practice (Nassaji & Fotos, 2011; Thornbury, 1999). In the inductive approach, however, the rules are not explicitly stated; instead, students are encouraged to infer, observe, and discover the rules while completing exercises (Ellis, 2002; Tomlinson, 2011). Several studies have examined the effectiveness of inductive or deductive grammar teaching in EFL settings, some of which are presented in this paper. The purpose of this study is to explore the role instructional approaches play in teaching grammar to pre-sessional students in higher education (Benitez-Correa, et.al, 2019; Farwis et al., 2021; Jean & Simard, 2013; Kaur & Niwas, 2016; Nesic & Hamidovic, 2015; Shirav & Nagai, 2022; Toth, 2022).

Literature review

Types of Grammar

Different types of grammar are taught in classroom settings, including pedagogical, prescriptive, descriptive and cognitive grammar. Descriptive grammar refers to how a language is used and understood without establishing its correctness. Thus, it emphasizes that language is alive and changes constantly (Nunan, 2005). Having said that, it is also important to recognize that L2 English speakers comprise an important part of the global population and that their contributions to the evolution of the language should also be considered.

Prescriptive grammar, on the other hand, refers to the dichotomy between correct and incorrect use of language, focused on standard linguistic forms and constructions (Hinkel, 2018). Prescriptive grammar is most prevalent in teaching, testing, editing, and publishing, and it is often used by people with access to social contexts and settings. Generally, prescriptive grammar is in line with deductive grammar instruction and is commonly employed in academic settings (Celce-Murcia & Larsen-Freeman, 1999; Hudson, 2001; Thornbury, 1999).

Pedagogical grammar is a set of grammar descriptions, exercises, and resources to facilitate the teaching and learning of a language through the participation of learners and teachers (Newby, 2015). In lesson design, according to Newby (2015), it is vital to establish learning objectives, decide how grammar rules will be presented to learners (either explicitly or inductively), and assess learners' grammatical proficiency. The concept of cognitive grammar was initially introduced by Wittgenstein in 1953, but formally developed by Langacker (1987, 1991) and expanded by Talmy (2000) and Croft & Cruse (2004). Cognitive grammar (Langacker, 2008) has not been directly applied in this study but offers useful theoretical insights. The study's emphasis on meaning and form fits with the principles of inductive learning, which the study later finds to be particularly successful.

Research into the effectiveness of inductive and deductive grammar learning

The deductive and inductive approaches to grammar instruction have been extensively researched in the last decades. Krashen (1985) claimed that language acquisition happens naturally before language learning, and Schmidt (2001) highlighted that second language acquisition is driven by learners' conscious awareness to the language. Deductive learning, according to H. Bluedorn and L. Bluedorn (2001), provides clear, understandable, and digestible instructions. Hammerly (1991) provides an alternative perspective that some grammar structures can be taught inductively while others can be taught deductively.

Jean and Simard (2013) examined possible relationships between learning gains, preferences, and learning styles. The results of this study showed that both approaches were equally effective, but students preferred the deductive approach. It was found that different forms of grammar instruction do not correlate with learning.

Eriksson (2014) conducted another study on the effectiveness of the inductive and deductive approaches to teaching word order. According to the study, the deductive method might produce better results among students with lower proficiency, yet the inductive approach should be preferred in the long run.

Similarly, Farwis et al. (2021) examined the effect of using inductive and deductive approaches on SLIATE students' English grammar achievement. Based on the study's findings, the deductive teaching approach to teaching grammar was more effective than an inductive approach. According to the results of the questions, students prefer a deductive approach and are satisfied with the way it was taught.

An examination of students' attitudes toward inductive and deductive approaches to teaching grammar in English as a foreign language was carried out by Nesic and Hamidovic (2015). The results showed that over 70% of students preferred the deductive approach to teaching English grammar, while over 40% acknowledged the implicit approach was also important. It was also

concluded that when these two approaches are combined, English grammar is effectively acquired.

A recent quasi-experimental study was conducted by Shirav and Nagai (2022) to investigate the effectiveness of inductive and deductive types of instruction in the acquisition of passive voice. The results showed that the inductive group performed significantly better than the deductive group. Furthermore, students expressed a preference for the deductive approach due to its traditional nature, and the study suggested using both methods depending on the complexity of the grammar being taught.

A review of recent literature suggests, according to Toth (2022), eight intermediate L2 Spanish classes were analyzed quantitatively and qualitatively from three U.S. high schools to document grammatical development using two explicit teaching methods on pronouns: deductive rule presentations and inductive co-construction. Deductive students performed slightly better than co-construction students in quantitative results; however, qualitative evidence suggests that implementing co-construction poses a greater challenge for teachers. Toth (2022) emphasizes the importance of high-quality explicit instruction for L2 development, and the role played by teachers in this process.

The study by Obeidat & Alomari (2020) examined the impact of inductive versus deductive teaching on the achievement of English as a foreign language (EFL) undergraduate students at Hashemite University. Their study indicated significant differences between the experimental group (inductive) and the control group (deductive) favouring the inductive approach, with no significant effects based on study year, school type, or gender.

An additional study examined the effectiveness of inductive and deductive methods in teaching English grammar at the elementary level was evaluated by Kaur and Niwas (2016). It was found that teaching via inductive method significantly improved student achievement. The pre-test and post-test scores of the deductive method showed similar results.

Similarly, another study investigated the effectiveness and rapport of two approaches to teaching grammar in EFL class in Ecuador (Benitez-Correa, et.al, 2019). The results showed that the inductive approach to teaching grammar is more effective than the deductive approach when it comes to instruction and rapport in the EFL classroom.

Accuracy, fluency, and complexity

When assessing learners' performance and progress, linguistic researchers must consider three factors: complexity, accuracy, and fluency (Housen & Kuiken, 2009). Complexity is defined by Ellis (2003) as "the extent to which the language produced is elaborate and varied" (p. 340). Alternatively, the ability to produce grammatically correct sentences that contain no errors is accuracy; fluency is defined as "the ability to produce words within a specified time frame,

together with lexical frequency, regardless of spelling and content, as long as the writer's meaning is understood" (Fellner & Apple, 2006, p. 19).

It has been suggested that complexity and accuracy are primarily influenced by the learner's interlanguage knowledge (grammar rules and lexical knowledge of the second language). Fluency, in contrast, is viewed as the ability to access significant L2 information quickly, easily, and efficiently to communicate meaning (Wolfie-Quintero et al., 1998). Cognitive complexity and linguistic complexity are used in L2 acquisition. A further definition of cognitive complexity is the degree to which linguistic features challenge learners to acquire and use L2. The level of cognitive complexity is determined by subjective and objective factors. The subjective factors relate to a learner's attitude, motivation, L1, and educational background, while the objective factors relate to the inherent linguistic complexity. Comparatively, linguistic complexity can be defined both in terms of the learner's interlanguage system and in terms of the individual linguistic elements that create the interlanguage system. Linguistic complexity is determined by the size, elaborateness, richness and diversity of the learner's L2 system in relation to the learner's interlanguage system (Housen & Kuiken, 2009).

The knowledge gap in the literature

In recent decades, a considerable amount of research has been devoted to various types of grammar instruction in EAP contexts. Contradictory results have been found in these studies (Eriksson, 2014; Farwis et al., 2021; H. Bluedorn & L. Bluedorn, 2001; Jean & Simard, 2013; Krashen, 1985; Nesic, 2020; Rivers, 1964; Schmidt, 2001; Shirav & Nagai, 2022; Toth, 2022). In certain studies, deductive grammar instruction was considered to be more useful, whereas inductive grammar instruction proved to be more efficient in regard to performance on grammar tests.

Aims of the study

A study of 100 pre-sessional English students in higher education examined the effects of three different grammar instruction approaches.

Research questions

RQ1: Does inductive, deductive, or a combination of both methods work best to develop grammatical knowledge in university L2 pre-sessional students?

RQ2: How do university L2 pre-sessional students perceive their progress in learning English grammar in the context of inductive and deductive learning methods?

Methods

The research settings and pre-sessional students

Students whose English language requirements do not meet the entry requirements are offered pre-sessional English language classes to develop and improve their English language skills before starting an undergraduate or post-graduate degree. The study took place at an educational institution in the UK, and the students were selected based on their language test scores (between 4.5 - 5.0 on the IELTS scale). The students attended a 12-week program. It is crucial for all pre-sessional students to develop their grammatical knowledge during the course to pass the final ELAS (English Language Assessment Service) test, which contains all the language skills, and progress on their postgraduate course.

Participants

There were 100 participants in the study, but only 91 completed the pre- and post-tests, and 54% were female and 46% were male. The participants were intermediate-level students grouped into different classes according to the month they enrolled at the university.

Research design

For the purposes of the experiment, a quasi-experimental control group pre- and post-test design was employed to test RQ1. Each of the three experimental groups was given a different name: students who were taught grammar deductively were assigned the name *Formal group*. Moreover, those who were taught grammar inductively were categorized as *Naturalistic*, and those who were taught grammar with both approaches were categorized as *Mixed*.

Research instruments

Student performance was assessed using pre-and post-testing. These tests were not part of the study program.

The following target structures were selected to be tested since the L2 pre-sessional students needed to develop their understanding of grammar.

- Active -passive voice
- Subject-verb agreement
- Verb tense consistency
- Conditional sentences
- Countable and uncountable nouns

- Prepositions
- Articles
- Error correction

The pre-post tests were adapted from John Eastwood's *Oxford Guide to English Grammar*, with the error correction exercise designed by the researcher and reviewed by a senior lecturer. The tests were initially piloted to determine appropriate timing and students' feedback on strengths and weaknesses of the pre-post-tests. A comprehensive scoring system was used, which incorporated points for each exercise, including the error correction exercise to determine if significant differences existed between groups in grammatical proficiency. This strategic approach was chosen to gain a comprehensive understanding of how various teaching methods affect participants' understanding of grammatical rules and their application. In this way, the study's outcomes were examined holistically, considering the relationship between various teaching techniques and their effects on students' performance.

Questionnaire

The purpose of this questionnaire was to investigate how instructional approaches influence students' perspectives on grammar teaching and learning during the pre-sessional period. There was a mixture of closed-ended questions and open-ended questions, and the reliability of the questions was tested using Cronbach's alpha index. Cronbach's alpha was used to test the reliability of closed-ended items, ensuring the items consistently measure the same concept, supporting the validity of the findings. Based on Cronbach's alpha, the reliability test showed a high level of reliability at 0.86.

Interviews

To obtain additional information and viewpoints, interviews were conducted with informants using the same questions of the questionnaire rephrased to assess the reliability of the respondents, cross-reference the data, and strengthen the interpretation. The interview data were analysed through coding.

Observations

As part of this study, non-participant observations were conducted to observe learners' participation during grammar instruction. The observation checklist primarily focused on how the lesson was conducted by inductive, deductive, or mixed methods. On the checklist, the date, time, location, teacher's name, class, and specific activities were listed. Four main categories were included in the checklist: organization, presentation, interaction, and content. Moreover, observation field notes were selected based on the tutor's presentation of deductive,

inductive, and combined grammar instructions, as well as the students' reactions to these grammar instructions. All participants received consent forms explaining the purpose of the observations and the researcher's role prior to the study. A total of 20 grammar lessons (N=20) were observed for approximately 30 and 45 minutes each. Each lesson lasted 3 hours.

Researcher's diary and field notes

Using the researcher's diary, the current study documented how pre-sessional students experienced and reacted to different types of grammar instruction and their experiences while learning grammar. The researcher examined the following criteria to understand which grammar instruction works best for pre-sessional students:

- An overview of the lesson's beginning, middle, and end.
- The impact of different grammar instruction types on teaching and learning activities.
- The methods and strategies used for teaching and how learners engaged and participated in the lesson.
- Which resources are used?
- The way the teacher explained grammatical features.
- The learners' reactions and responses during the lesson.
- How did the researcher feel about the deductive or inductive approach or the combination of both?

Bailey's (1991) suggestions were used to collect, analyze and code the data. In addition, a tally sheet was used to measure learners' participation. Data analysis consisted of reading the entries, observing themes, and identifying recurring patterns. To reduce the data, the researcher discussed the criteria and codes that emerged from the diaries and observational notes with another researcher. To test the reliability of the codes, Miles and Huberman (1994) formula was used. Specifically, 46 codes were examined by the second rater, who agreed with 41 of the categories, resulting in a final reliability of 0.91, which is a high level of inter-rater reliability.

Data analysis

Quantitative results: Pre-post-language tests

The results showed that all groups performed well in the post-tests. To assess students' grammatical knowledge, the researcher decided to use mainly discrete items and a single integrative task (error correction). Inferential statistical analysis was used to determine the significance of the difference between the three groups and to test the research question (RQ1). The t-test revealed that students' grammatical competence was significantly increased by the deductive approach (see Tables 1, 2, and 3).

Table 1. T-tests for Formal group.

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Pre-language test</i>	<i>Post-language test</i>
Mean	41.17391	48.73913
Variance	161.8775	203.4743
Observations	23	23
Hypothesized Mean Difference	0	
Df	43	
t Stat	-1.89815	
P(T<=t) one-tail	0.032201	
t Critical one-tail	1.681071	
P(T<=t) two-tail	0.064402	
t Critical two-tail	2.016692	

Statistically, there was a significant difference between each group's grammar performance at the significance level of 0.10, as shown by the results of the pre- and post-tests. It appears that the Formal group (deductive approach) performed significantly better with $t(43) = -1.89$, $p = 0.064$, which indicates a statistical trend close enough to the significance threshold of 0.05 (see Table 1).

Nonetheless, when comparing the two groups using a paired samples t-test (see Table 2 for details), the Mixed group performed slightly better [$t(72) = -1.734$, $p = 0.087$] than the Naturalistic group, who were taught grammar inductively [$t(37) = -0.531$, $p = 0.597$] (see Table 3). A p-value below 0.05 indicates significance, 0.05-0.10 suggests a trend, and above 0.10 means not significant. Thus, the Mixed group's result ($p = 0.087$) shows a slight trend toward better performance, while the Naturalistic group's result ($p = 0.597$) shows no significant difference.

Table 2. T-tests for Mixed group.

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Pre-language test</i>	<i>Post-language test</i>
Mean	52.81081	56.24324
Variance	68.37988	76.46697
Observations	37	37
Hypothesized Mean Difference	0	
Df	72	
t Stat	-1.7348	
P(T<=t) one-tail	0.043528	
t Critical one-tail	1.666294	
P(T<=t) two-tail	0.087056	
t Critical two-tail	1.993464	

Table 3. T-tests for Naturalistic group.

t-Test: Two-Sample Assuming Unequal Variances		
	<i>Pre-language test</i>	<i>Post-language test</i>
Mean	52.80645	54.41935
Variance	157.628	128.0516
Observations	31	31
Hypothesized Mean Difference	0	
Df	59	
t Stat	-0.53131	
P(T<=t) one-tail	0.298599	
t Critical one-tail	1.671093	
P(T<=t) two-tail	0.597197	
t Critical two-tail	2.000995	

Results indicate that L2 students who are taught grammar deductively or by combining deductive instruction with inductive instruction performed slightly better than those who are instructed inductively. However, this study was limited to 100 students. Additional research using larger samples, longer timeframes, and examining other variables might provide more insights.

Questionnaire

To analyse the demographic information from the questionnaire, including nationality, gender, and age, frequency analysis was used. The following codes (*practice, exercise, confusion, communication, teacher, example, rules, tenses, environment, monitor grammar, and learners' anxiety*) were examined by a second rater. The second rater agreed with 10 of the categories related to the method of instruction, resulting in a final reliability of 0.90, a high level of inter-rater reliability.

Questionnaire analysis

A written questionnaire was used to learn and understand students' attitudes and feelings toward learning grammar through different methods of grammar instruction. All the participants (p=100) agreed that grammatical knowledge is important when learning a second language for academic purposes (see Table 4).

Table 4. *Is grammar important in academic writing?*

Is grammar important in academic writing?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, very important	99	99.0	99.0	99.0
	Yes, important	1	1.0	1.0	100.0
	Total	100	100.0	100.0	

The fourth question was included to provide context for understanding how students perceive grammar, which can impact the way they respond to different instructional approaches. By understanding these attitudes, it is possible to better understand the effectiveness of deductive, inductive, and mixed methods. As far as learners' preferred method of learning and teaching grammar (presenting rules vs. discovering the rules), the majority (69%) preferred to be taught grammar deductively (see Table 5).

Table 5. *Which of these approaches to teaching grammar do you generally prefer?*

Which of these approaches to teaching grammar do you generally prefer?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The teacher presents the rules to the students	69	69.0	69.0	69.0
	Students are guided to work out the rules for themselves	31	31.0	31.0	100.0
	Total	100	100.0	100.0	

The participants strongly agreed that practicing grammar structures could improve grammatical accuracy (90%) as well (see Table 6). The studying of grammatical rules explicitly could help students make progress in their grammatical competence and perhaps improve their accuracy levels; however, it will take learners some time to absorb, acquire, internalise, and practice all the grammatical structures. A high level of motivation and interest in learning could have long-lasting effects on learners' learning (irrespective of the type of grammar instruction).

Table 6. *I believe that I can improve my grammatical accuracy through practice of grammatical structures.*

I believe that I can improve my grammatical accuracy through practice of grammatical structures.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	1.0	1.0	1.0
	Neither agree nor disagree	9	9.0	9.0	10.0
	Agree	22	22.0	22.0	32.0
	Strongly agree	68	68.0	68.0	100.0
	Total	100	100.0	100.0	

The next point worth emphasising is that most of the surveyed participants (80%) agreed that learning grammar through context was also important (see Table 7). However, the use of texts in learning grammar was only perceived as less important by a few participants, indicating that most learners understand the importance of using texts in learning grammar. The inclusion of cognitive grammar in this study does not directly compare it with other frameworks, but it reveals the influence of different perspectives on grammar teaching. The concept of cognitive grammar emphasizes the connection between form, meaning, and usage, which supports inductive approaches that allow learners to identify patterns by using language. It provides a meaningful way to consider how grammar can be taught more effectively than traditional rule-based methods.

Table 7. *Grammar is best taught if it is presented within a complete text.*

Grammar is best taught if it is presented within a complete text.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	1.0	1.0	1.0
	Disagree	8	8.0	8.0	9.0
	Neither agree nor disagree	11	11.0	11.0	20.0
	Agree	28	28.0	28.0	48.0
	Strongly agree	52	52.0	52.0	100.0
	Total	100	100.0	100.0	

In the survey, almost all respondents (92%) said they expect a teacher to explain a grammatical point (see Table 8). The collected data provides illustrative evidence regarding learners' expectations and needs during grammar learning.

Table 8. *I expect my teacher to present and explain grammatic points.*

I expect my teacher to present and explain grammatical points.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.0	2.0	2.0
	Neither agree nor disagree	6	6.0	6.0	8.0
	Agree	33	33.0	33.0	41.0
	Strongly agree	59	59.0	59.0	100.0
	Total	100	100.0	100.0	

Lastly, using examples to learn grammar rules was another interesting outcome as (93%) stated that they prefer to learn grammar using examples (see Table 9). While the deductive approach to teaching grammar remains popular, pre-sessional students should be exposed to other teaching styles. Although, this study did not aim to compare grammatical theories, but the observed benefits of combining rule explanations with contextual usage align conceptually with cognitive grammar (Langacker, 2008), which emphasizes the interconnection between form, meaning, and use (Langacker, 2008). The purpose of this reference is not to claim any grammar model as superior, but rather to illustrate how theoretical insights might help explain why integrated approaches contributed to learner success.

Table 9. *I prefer to learn grammar forms through examples.*

I prefer to learn grammar forms through examples.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	2.0	2.0	2.0
	Neither agree nor disagree	5	5.0	5.0	7.0
	Agree	20	20.0	20.0	27.0
	Strongly agree	73	73.0	73.0	100.0
	Total	100	100.0	100.0	

Coding analysis

During the current study, coded data were generated from interview transcripts, the researcher's diaries, observations, and open-ended questions. The researcher analyzed, evaluated, and conducted a thematic analysis by identifying themes and codes. By assigning words or phrases to each category, the researcher coded all the textual data systematically (Dey, 1993). Table 10 presents a sample of the analysis of the codes derived from interview transcripts and open-ended questionnaires. The researcher originally generated fifty-five codes but later reduced them to thirty-eight after closer examination. Moreover, a second code-book was developed from diaries and observational notes, with forty-seven provisional codes, but only forty-two were used for the main study. A sample of these codes is presented in Table 12.

Table 10. Coding scheme for interview/questionnaire (open questions) data.

Main Themes	Sub-theme
1. Importance of knowing grammar	Grammar allows learners to describe different situations Complex situations and structures require good grammar
2. Terminology is important	Grammatical terminology is useful The use of tenses is more important not the names
3. Practice and Exercises	Practice grammatical exercises
4. Confidence	Learning grammar deductively could increase confidence
5. Academic writing	Formal writing
6. Writing	Grammar is important for writing Essays + grammatical rules and structures
7. Grammar rules are not important	No link between grammar and real world
8. Terminology not important	Grammatical terminology is not important Not remembering all the tenses Simplify grammar

After identifying the main codes and subcategories, the researcher used examples of participants, and theoretical frameworks to conduct thematic analysis. A sample of the analysis is presented in Table 11.

Table 11. Sample of thematic analysis (Interview/questionnaire).

Category (descriptive code)	Sub-categories	Examples	Theory
Importance of knowing grammar	<ul style="list-style-type: none"> Grammar allows learners to describe different situations Complex situations and structures require good grammar 	<ul style="list-style-type: none"> <i>(You need to know how grammar consists of)</i> <i>(Without grammatical rules we cannot structure a sentence)</i> <i>(For me is the most important thing)</i> <i>(There are many different ways in order to express something, another way of thinking)</i> <i>(Tell about a story which is complicated.... we need to use past, future and present)</i> 	<ul style="list-style-type: none"> -Prescriptive grammar -Grammar serves as a prerequisite for effective communication as it increases accuracy.

Grammar rules are not important	No link between grammar and real world	<ul style="list-style-type: none"> • <i>(grammatical rules are not important to me)</i> • <i>(it is important but not the most important thing)</i> • <i>(grammar is an unimportant thing)</i> • <i>(I think it is an unnatural activity)</i> • <i>(I did not find anything important and that's why I do not want to study anymore grammar)</i> • <i>(there is no a real linkage between grammar and real world)</i> • <i>(in real life we do not do grammar, the only thing is to talk and convey meaning)</i> 	-Teaching grammar inductively -Fluency
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Data gathered by coding the interviews indicated that six participants stressed the importance of grammatical knowledge in the context of producing an academic paper. It is therefore consistent with prescriptive grammar theories, which address the correct application of grammar rules (Hinkel, 2018). The study suggests that pre-sessional L2 learners are aware of the importance of constructing sentences syntactically and morphologically, one of the most valuable aspects of higher education. Alternatively, seven respondents viewed grammar as unimportant. This finding is consistent with Krashen's (1985) claim that learners are able to acquire grammatical structures unconsciously through exposure rather than explicit teaching. Despite not directly correlating with cognitive grammar theory (Langacker, 2008), this study raises the possibility of implicit learning and its role in language acquisition. The results further support the notion that fluency refers to the ability of learners to control their linguistic knowledge of the second language. The ability to access significant L2 information quickly, easily, and efficiently is more important than focusing solely on producing accurate forms to communicate meaning (Wolfie-Quintero et al., 1998).

Table 12. Coding scheme for diaries/observational notes.

<u>Inductive Approach</u>	<u>Deductive Approach</u>	<u>Mixed (Inductive/Deductive) Approach</u>
1. starting, middle and finishing point of the lesson, 2. grammatical explanation and rules, 3. participation 4. terminology, 5. learners, 6. teacher, 7. researcher's feelings and interpretation, 8. mistakes, 9. error correction, 10. atmosphere, 11. confusion,	1. starting, middle and finishing point of the lesson, 2. teaching grammar deductively 3. terminology and rules 4. learners, 5. teacher, 6. researcher's feelings and suggestions, 7. confusion 8. mistakes, 9. course book, 10. atmosphere, 11. motivation and participation 12. pace of the lesson,	1. starting, the middle and finishing point of the lesson, 2. learners and learners' questions, 3. teacher, 4. terminology, rules and explanation, 5. combination of grammatical structure 6. researcher's feelings, 7. mistakes, 8. practice, 9. cognitive ability, 10. confusion, 11. examples 12. atmosphere 13. participation

12. lack of vocabulary, 13. time 14. interesting activities	13. practice, 14. examples 15. time	
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Main codes from the researcher's diary on inductive approach.

Based on lessons taught using the inductive approach, the following categories appeared in the teacher's diaries: starting, middle, and ending point of the lesson, explanation, rules, terminology, learners, teacher, researcher's feelings, mistakes, error correction, atmosphere, confusion, a lack of vocabulary, time limit and interesting activities (Table 12). These categories may be correlated with teaching theories of cognitive and linguistic complexity, pedagogical grammar, descriptive and cognitive grammar as well as fluency (Housen & Kuiken, 2009; Langacker, 1987; Newby, 2015).

Main codes from the researcher's diary on deductive approach.

As a result of the researcher's diaries, the following codes emerged concerning the criteria used to evaluate the lessons delivered using the deductive approach: the beginning, middle and end of the lesson, teaching grammar deductively, learners, teacher, researcher's feelings and suggestions, confusion, mistakes, course book, atmosphere, motivation, pace of the lesson, participation, practice, examples and time (Table 12). In light of the codes above, as well as the nature of the lesson, they appear to be related to theories of cognitive and linguistic complexity, explicit grammar instruction, prescriptive grammar instruction, and accuracy (Housen & Kuiken, 2009; Newby, 2015).

Main codes from the researcher's diary based on mixed (inductive/deductive) approach.

Similar codes emerged throughout the data analysis: beginning, middle, and end of the lesson, learners' questions, teacher, terminology, rules, explanations, researcher's feelings, mistakes, practice, participation, combination of grammatical structures cognitive ability, confusion, examples, and atmosphere (Table 12). The codes may be influenced by the theory of cognitive and linguistic complexity, pedagogical grammar, implicit and explicit grammar teaching, descriptive and cognitive grammar (Housen & Kuiken, 2009; Langacker, 1987; Newby, 2015).

Summary of observational checklist

Although the Formal group had a good understanding of grammar, they sometimes struggled with accurate language use, likely due to teacher-centred lessons focussing on standard forms. The Naturalist group was continuously guided through the elicitation process to discover

grammar rules but only to a limited extent. This may be due to cognitive and linguistic complexity factors, L1 interference, or interlanguage development (Housen & Kuiken, 2009). The Mixed group was provided with implicit and explicit rules, but they were described briefly. This caused some difficulties for low-level learners to comprehend the rules. It may be due to their limited time, as well as the linguistic and cognitive complexity of certain grammatical structures (Housen & Kuiken, 2009). It appears that learning grammatical structures is influenced by learners' motivation, interests, expectations, and expectations regarding grammatical structures.

Discussion

The results of this study are consistent with those of Farwis et al. (2021) and Toth (2022), which concluded that the deductive approach affected learners' grammar performance. Moreover, these findings provide evidence that a combination of these two approaches may be an appropriate solution to the controversy identified Jean and Simard (2013), Eriksson (2014), Nesic (2020), and Shirav and Nagai (2022). Although it can be argued that learners' involvement is limited when deductive thinking is employed, the teacher, however, should incorporate exercises that promote deep thinking.

The present study provides significant evidence to support the integration of both methods in pre-sessional settings. Some grammar structures can be taught inductively, while others need to be taught deductively. As Hammerly (1991) points out, the deductive approach is more appropriate for teaching active or passive voice because these structures depend on rules and require explicit explanations.

Both types of grammar instruction are effective, relying solely on the inductive approach might be challenging to some extent. The present study also supports the second research question, that methods of teaching can influence the performance of students, as many participants improved their grammatical competence and scored higher on the post-test. Also, most learners preferred explicit grammar explanations with examples and text integration. Combining cognitive grammar with prescriptive grammar could enhance learning (Langacker, 1987).

Field notes revealed that students struggled with prepositions, articles, and countable and uncountable nouns when taught deductively. Teaching grammar inductively also presented difficulties in terms of converting sentences from active to passive and differentiate between *will*, *going to*, and *present continuous*. Low-level students may have difficulty learning due to limited time and cognitive and linguistic complexity (Housen & Kuiken, 2009).

While inductive teaching was engaging, learners found it difficult to understand the grammatical rules being introduced. When teaching grammar deductively in pre-sessional classes, certain grammatical structures may need to be explicitly taught along with implicit teaching, such as conditional sentences and passive voice (Hammerly, 1991).

The current study's findings, however, cannot be generalised and interpreted as definitive outside of this specific academic setting because there were only one hundred L2 pre-sessional students. Further research should explore holistic language learning, including authentic language use, cultural knowledge and understanding, motivation, learner autonomy, and diverse instructional approaches. Investigating the linguistic and cultural diversity in grammar instruction could also help develop more effective and inclusive teaching strategies.

Conclusion and limitations

Both grammar instruction types had significant effects on the acquisition of seven grammatical structures in university L2 pre-sessional students. According to the findings of this study, L2 students benefit most from deductive or combined grammar instruction. Even though inductive learning is valuable, it can present challenges for some learners because of their educational backgrounds, learning abilities, and cultural experiences. A deeper exploration of how these factors affect learners' ability to independently discover grammar rules would indeed provide valuable insights into ways to make grammar instruction more effective.

Nevertheless, this does not imply that there are no educators who teach grammar through the inductive method. Combining both types could therefore be the best solution for each learner's needs. The present study also confirms that students' perceptions are correlated to performance, with motivation and teaching methods influencing outcomes.

The purpose of this study was to analyze the effectiveness of teaching methods rather than grammatical theories. However, cognitive grammar (Langacker, 2008) offers valuable insight into the interaction between form, meaning, and usage. This experiment, however, cannot conclude anything about the relative effectiveness of grammar types because of its design and scope. For future research, examining how cognitive grammar relates to instructional methods will be important.

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