



# Relationships between Students' Grammar Acquisition, Computer Literacy and Self-Regulation Variables in a Virtual Learning Environment with Wiki-Based Grammar E-Tivities

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## Abstract

*The literature on CALL (computer-assisted language learning) indicates that various psychological characteristics of learners may determine the process of language learning and its outcomes [1], especially in constructivist, learner-based paradigms [2]. It has been argued that hybrid learning settings offer increased opportunities for individualization and collaboration [3]. However, research on the interrelationships between individual variables that may affect students' grammar development in a hybrid English as a foreign language (EFL) environment supported by web 2.0 tools is fairly scarce. The aim of the study in this paper was to establish the correlation between the acquired knowledge of five morphosyntactic structures, two learner characteristics associated with computer literacy and three self-regulation variables in EFL grammar instruction within the socioconstructivist paradigm. The subjects in our study were students of Information Systems at a Croatian university enrolled in a hybrid EFL course. They were engaged in collaborative out-of-class e-tivities using wikis and other web 2.0 tools to describe and illustrate advanced grammar topics. The acquired grammatical competence (GC) was assessed by a written test. The data on learner variables were collected by a survey questionnaire. Both instruments were administered after the completion of e-tivities. The correlation analysis revealed statistically significant associations between the outgoing GC and two variables: (1) students' perception of self-efficacy and (2) their perceived effort in using the computer (negative correlation).*

**Keywords:** *Computer-assisted language learning, EFL grammar, computer literacy, self-regulation*

## 1. Introduction

In the research of computer-assisted language learning (CALL) individual learner characteristics are becoming more intensely recognized as variables that can determine the effectiveness of language instruction supported by digital tools [1] [2] [4] [5]. In terms of learner variability, of particular importance to the Second Language Acquisition field are *individual differences*, or "characteristics of traits in which individuals may be shown to differ from each other" ([6]: 2). In CALL settings, learner autonomy is seen as a prerequisite for utilizing the affordances of CALL and overcoming its constraints [7] which is associated with the use of strategies and self-regulation. Learners' *self-regulatory capacity* refers to the degree to which "they are active participants in their own learning" [6]: 45. Three dimensions of self-regulation are commonly distinguished: metacognitive, motivational and behavioural, manifested as "self-generated thoughts, feelings, and actions towards attaining one's goals" [8]: 73. Moreover, to successfully engage in instructed FL learning online, students need to possess a satisfactory level of *computer literacy*, which beyond mere technical skills implies the awareness of how computers can be used for learning [9].

This paper focuses on the use of *web 2.0 tools*, which over a decade ago brought about a new approach to the development and design of technological platforms [10]. The affordances of web 2.0 tools (such as creation and publishing of online content, participation and networking [10]) were intertwined with constructivist, learner-oriented pedagogies within the *e-learning 2.0* paradigm [11], also adopted in EFL instruction [12]. Web 2.0 tools are widely used in language teaching as a CALL component in hybrid instruction. The effectiveness of the use of social software (i.e. web 2.0 tools) for promoting active learning will rely on learner's ability to regulate their own learning by "monitoring, reflection, testing, questioning and self evaluation" [13]: 29. Active and participatory learning can be incorporated in FL instruction through the pedagogical format of collaborative *e-tivities* [14].

In this paper we examine the role of individual characteristics of learners related to their self-regulated learning and computer literacy in performing e-tivities in web 2.0 tools aimed to develop GC. The approach to grammar instruction in our research is a combination of form-focused language instruction, collaborative writing and constructivist pedagogy.



## 2. Definition of constructs in this paper

The variables defined for investigating the connection between individual characteristics and the development of GC were conceptualized as:

- learner characteristics which constitute *self-regulated learning*:
  - 1) *Perceived self-efficacy in learning EFL* – the motivational component of self-regulation [15]; learner's beliefs regarding their own ability to organize and perform actions needed to fulfil a specific goal [16];
  - 2) *Personal goal-setting* – the metacognitive component of self-regulation [15]; “the process of establishing clear and usable targets, or objectives, for learning [17]: 153;
  - 3) *Effort invested in using online resources in the EFL course* – the students' assessment of the degree of their out-of-class engagement with online materials in their EFL course; the behavioural component of self-regulation [15];
- learner characteristics which constitute their *computer literacy*:
  - 1) *Effort in using the computer* – negative beliefs of a user of technology regarding its use or training for its use that arise from the complexity of its implementation for performing tasks [18];
  - 2) *Internet self-efficacy* – the individuals' perception of the ability to use the internet [19].

In the particular context of our study, the outgoing *Grammatical competence (GC)* was conceptualized as the acquired knowledge of particular morphosyntactic structures in EFL in the post-test after the performance of e-tivities.

## 3. Method

### 3.1 Research questions

The aim of the study in this paper was to establish a correlation between the knowledge of five grammatical structures on the one hand, and learner characteristics associated with their perception of their own self-regulated learning and computer literacy on the other. The following research questions were defined for our empirical study:

- **RQ1:** Is there a relationship between (a) the *three psychological characteristics* within the construct of *self-regulated learning* and (b) the acquired knowledge of particular grammatical structures in English after the performance of e-tivities using web 2.0 tools?
- **RQ2:** Is there a relationship between (a) the *two learner characteristics* within the construct of *computer literacy* and (b) *the acquired knowledge of particular grammatical structures in English* after the performance of e-tivities using web 2.0 tools?

### 3.2 Sample and procedure

The sample in our study were 89 first-year undergraduate students of Information Systems at a Croatian university – 71 (79,8%) male and 18 (20,2%) female respondents mostly aged 19-21. All the subjects were enrolled in the hybrid EFL course in which the e-tivities were conducted. The survey was completed by all the 89 respondents, while 80 of them participated in the grammar test.

The subjects were engaged in collaborative out-of-class e-tivities using wikis and other web 2.0 tools. Each team was required to create two descriptions of two different grammar concepts on a separate wiki page to which they added multimedia artifacts made by different web 2.0 tools. The tools used to illustrate grammar concepts were: *Bubbl.us* and *Mindomo* (mind maps); *Glify* (concept maps) and *Bubblr* (cartoon strips). Figure 1 shows an excerpt of a students' mind map on the topic of Causative *have* made by means of the *Mindomo* tool. The multimodal artifacts were linked to respective pages in a course wiki which served as a repository of students' short textual descriptions of EFL grammar. The data on learner variables were collected by a survey questionnaire after the completion of e-tivities. The GC test was also administered after the performance of e-tivities. The observed structures were: Unreal conditions; Causative *have*; Subjunctive and unreal past; Reported questions and commands; Participle phrases. The total score in the test was taken as the criterion variable.

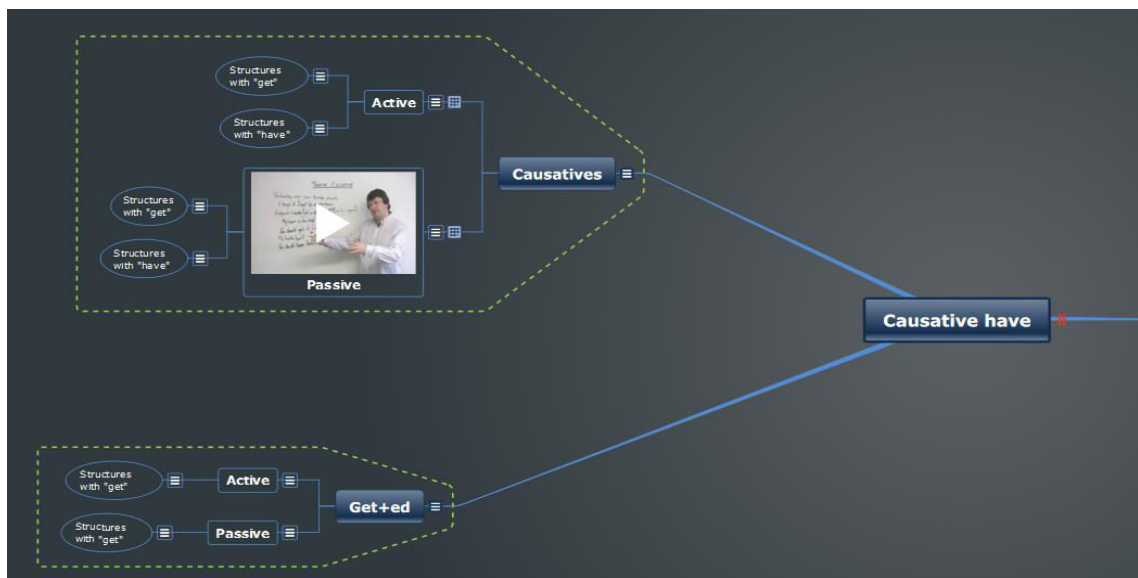


Fig. 1. Excerpt from a grammar multimedia artifact (mind map) in the *Mindomo* tool

### 3.3 Instruments

In our empirical research the following two instruments were administered: (1) *a survey questionnaire* and (2) *GC test*. The *questionnaire* was used for collecting data on (a) 3 learner variables related to self-regulation defined in Section 2 of this paper (3 scales; adapted from [20] [21], including several items created by the authors of this paper) and (b) 2 learner variables related to computer literacy defined in Section 2 of this paper (2 scales; adapted from [18] [19] [21], including several items created by the authors of this paper). The total score in the test was taken as the criterion variable. The first part of the *GC test* consisted of 10 English sentences which contained an underlined grammatical mistake related to one of the five targeted grammatical structures. The second part of the test consisted of 10 English sentences which contained a grammatical mistake which was not underlined. Subjects had to write the correct version of all the sentences (in the first and second part of the test) and also identify (underline) the grammatical mistake (in the second part of the test).

## 4. Results and discussion

To address the two research questions in our study, we used the Pearson correlation analysis of the data collected by the survey and the GC test. Statistically significant associations were obtained between the outgoing GC in the test and two learner variables: *Perceived self-efficacy* and *Effort in using the computer*.

### 4.1 Self-regulated learning variables and outgoing GC

We hypothesized that the outgoing GC, i.e. the total score in the post-test as an indicator of the acquisition of the targeted grammar concepts after the performance of e-tivities, would be associated with students' perceived self-regulated behaviour. However, from the three variables related to self-regulated learning in our research, the only statistically significant (moderate) correlation between the acquired GC and self-regulation was established for *Perceived self-efficacy in learning EFL* ( $r = -0.425$ ,  $p < 0.01$ ). On the other hand, no statistically significant interrelationships were obtained between GC and *Personal goal-setting* and *Effort invested in using online resources*, respectively. Such findings suggest that students who more positively perceived their own ability to perform the task in e-tivities which implied several challenges (collaborative online format, autonomous out-of-class work, content complexity, usage of digital tools, creating multimodal representation of language content) were also more successful at improving their GC. The literature on self-efficacy provides evidence on positive correlation between self-efficacy and achievement in learning, which may be related to higher levels of intrinsic motivation, self-confidence and positive self-evaluation, and readiness to take up challenge and overcome obstacles [22], [23]. Moreover, we can assume that the acquisition of morphosyntactic structures measured by the GC test in our study was related to self-efficacy in learning EFL (as reported by subjects in the survey questionnaire) as the motivational component of self-regulation.



## 4.2 Computer literacy variables and outgoing GC

It was also hypothesized that the outgoing GC, i.e. the total score in the post-test after the performance of e-tivities, would be associated with students' perceived information literacy. From the two variables that constitute self-regulated learning in our research, the only statistically significant (weak) *negative* correlation between the acquired GC and information literacy was established for *Effort in using the computer* ( $r=-.303$ ,  $p<0.01$ ), while no significant association was established between GC and the respondents' perceived *Internet self-efficacy*. In other words, students who perceived less effort invested in working with computers (which probably also included using wikis and other web 2.0 tools in e-tivities) performed better in the GC test. Broadly speaking, we could assume that in hybrid settings, in which students rely on using online tools for learning in addition to face to face instruction and interaction with peers, the ability to use digital tools represents one of the factors of learning success, especially in out-of-class activities in which students need to exercise autonomy in using both the EFL and technology. However, the established correlation between grammar attainment and computer skills manifested by low effort in using the computer does not imply a causal relationship. It could therefore be claimed that, conversely, the lower level of effort in using the computer for e-tivities was reported by students with a higher level of EFL competence who, owing to their language proficiency, more easily mastered new web 2.0 applications and the task that had to be performed online.

## 5. Conclusion

The aim of the study in this paper was to establish the correlation between the acquired knowledge of particular grammatical structures and learner characteristics associated with computer literacy (effort in using the computer, and internet self-efficacy) and self-regulation variables (self-efficacy in learning EFL, personal goal-setting, and effort in using online resources in the EFL course). After the empirical study was completed the correlation analysis of the collected data revealed statistically significant associations between the outgoing grammatical competence and two variables: (1) students' perceived self-efficacy in learning EFL and (2) their perceived effort in using the computer (negative correlation). Such findings imply that learner achievement in EFL grammar e-tivities conducted in a socioconstructivist learning scenario does not only rely on their language ability, but may also be related to their positive perception and awareness of their own capacity to complete academic tasks and resolve potential task- and technology-related difficulties. The obtained empirical evidence may be useful in providing guidelines for training students for online learning success in similar collaborative grammar-based tasks in a hybrid setting.

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