

# The Effect of Different Online Procedural Prompts on Student-Generated Questions Task Performance for English Grammar Instruction

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**Abstract:** Research on the effectiveness of Student-Generated Questions (SGQ) has been researched and studied over the past years, and there is a great deal of literature on how to enhance the process and performance of SGQ via procedural prompts for learners. However, research on the learning effects of different procedural prompts for students in SGQ is scarce. Using a group of 55 English language learners, this paper will argue that students in SGQ will benefit differently from procedural prompts with their different degrees of structures. Based on the results of paired *t*-test, students in SGQ were found to perform better on the online SGQ task with the ‘main idea’ procedural prompt than with the ‘what-if-not’ procedural prompt in the fluency index. Yet, no significant differences were observed between the two provided procedural prompts in the flexibility index.

**Keywords:** English grammar instruction, online learning activity, procedural prompts, student-generated questions, task performance

## 1. Introduction

### *1.1 Background of the Study*

There has been an increasing interest in what and how students can benefit from Student-Generated Questions (SGQ) (Chin & Brown, 2002; Tho, Lai & Navratil, 2020). With scholars finding that students in the process of SGQ encountered problems and difficulties (Yu, 2009), issues regarding how the process of SGQ can be further enhanced with the assistance of different approaches and their effects on facilitating the process of SGQ await to be examined. Some proposed increasing students’ perceived value in the engaged SGQ task so as to influence the use of learning strategies during the process of SGQ (Yu & Wu, 2008). Other researchers advocated that the use of different kinds of instructional arrangements. For example, White and Gunstone (1992) proposed an idea of providing a stimulus in the process of SGQ such as a picture or a diagram on which questions were to be based, or providing an answer to a question, and students were asked to generate a question based on the given answer.

Oftentimes, researchers investigated the concept and use of procedural prompts on students’ SGQ performance, and the main idea and what-if-not procedural prompts are among the most studied and implemented procedural prompts in both research and practice. For example, with the ‘main idea’ procedural prompt, students are directed to think about what and how to generate the questions with answers based on the main idea of the learning materials. Davey and McBride (1986) trained 260 six-grade elementary students to use the main idea procedural prompt to generate questions and evaluated the generated questions, and students were found to have a better understanding on the reading passage. Also, third-grade elementary students provided with the main idea procedural prompt were found to have better understanding on the assigned reading passage, which was also found in the study conducted by Cohen (1983). Alternatively, the what-if-not procedural prompt proposed by Brown and Walter (1983) emphasizes having students use a process of varying the conditions, factors or goals of given problems. Swan (2008) found providing the what-if-not procedural prompt eased the process of math-related question generation on students’ learning of secondary level algebra. Other studies have found students who were supported with the what-if-not procedural prompt during the question-generation

process had better question-generation performance in terms of creativity and flexibility indices (Silver, 1997). Students at the tertiary level also reported that SGQ with what-if-not made it possible for them to apply what they learned in class in future settings (Petrilli, Clark, Demarco, Esposito & Giuliano, 2020). Given the effectiveness and affordance of using main idea and what-if-not procedural prompts for students to generate questions, and the distinct nature and unique affordance of the two procedural prompts, when comparing main idea and what-if-not procedural prompts in the SGQ process, it is vital to further understand the application of using the two procedural prompts.

While research aimed at validating the effect of respective procedural prompts on students' SGQ performance abound, limited research comparing the effects of different procedural prompts for students in SGQ is around. As such, their comparative effects on the process of SGQ are yet clearly known. In light of the fact that procedural prompts are different in terms of levels of support, their effects on learning are expected to vary. Thus, the purpose of the study is to explore the effect of two procedural prompts, main idea and what-if-not, on SGQ task performance for foreign language learners in SGQ.

### *1.2 The Importance of Learning English and Innovative English Teaching Approaches to Promoting English Proficiency*

The idea of learning English as a second or foreign language (ESL or EFL) has been recognized prevalent around the world. The importance of inspiring people to learn English is widely acknowledged throughout the Asian regions, and English has been used as an official language in many places around the world (e.g., Canada, Hong Kong, Singapore, India, Philippine, Malaysia, and so on) (Feng, 2011).

Given the increasingly high demand for English proficiency, the effort to encourage students from the elementary to tertiary level to learn English has been highly appreciated. For instance, several universities in Taiwan set regulations for students, which requires university students to pass a certain level of English proficiency in order to get the university diploma (Wu & Wu, 2010). However, the English proficiency level of students in Taiwan still falls behind its neighboring countries in the Asian regions. According to the report by Educational Testing Services (2019), the average score of Test of English for International Communication (TOEIC) of test takers in Taiwan in 2018 ranked 39<sup>th</sup> out of the 49 participating countries. In light of this, thinking of ways to improve English teaching and learning in Taiwan has been a key concern for English teaching practitioners and learners.

Over the last decade, there are a growing number of studies focusing on innovative ways to improve students' English proficiency in Taiwan. For example, students at the high school level were found to have improved learning motivation and achievements with the use of mobile devices on English learning (Tsai, Cheng, Yeh & Lin, 2016). The application of instant messaging on English listening and speaking practice was also investigated on English learners at tertiary level and the results showed learners' satisfaction and motivation were improved (Wang & Cheng, 2017). With the generally positive learning effects of SGQ, and in light of contemporary educational paradigms highlighting designing learning tasks and including instructional practices that allow students to demonstrate the knowledge, skills, and abilities they master in the classroom (Guzman-Orth, Song & Sparks, 2019; Ketterlin-Geller, 2017) and meet their learning needs (Pitoniak, Young, Martiniello, Buteuz, Ginsburgh, 2009), SGQ has been successfully applied by English teachers to support English learning (Song, Oh, & Glazewski, 2017; Yu, Chang, & Wu, 2015).

### *1.3 Scaffolding Theory*

Based on the notions of constructivism and social-cultural-history theory proposed by Vygotsky, scaffolding theory puts forward the important concept of an individual's knowledge construction through his/her interaction with the surrounding environment (Vygotsky, 1974). It is believed that learners' intellectual development could be further enhanced with the assistance from the environment, and students could reach their potential development level beyond the existing development level, namely the Zone of Proximal Development (ZPD) (Wood, Burner, & Mercer, 1976).

Since its inception, there have been numerous applications of scaffolding in education (e.g., Azevedo & Hadwin, 2005; Dagoc & Tan, 2018; Davis & Miyake, 2004; Park, Xu, Collins, Farkas, &

Warschauer, 2019) and review papers (e.g., Bakker, Smit, & Wegerif, 2015). For instance, Azevedo and Hadwin (2005) discussed the effectiveness of computer-based scaffolds for developing learners' self-regulated learning and metacognition and explored how scaffolded support could be provided through questioning via the use of static prompts or templates in a computer-based learning environment. Dagoc and Tan (2018) examined the effectiveness of metacognitive scaffolding on mathematics performance of grade six learners, and the results showed that learners with help on the use of metacognitive scaffolding performed better on their mathematic performance. Park, Xu, Collins, Farkas, and Warchauer (2018) found that English-speaking elementary students with clear guidance in the form of visual-syntactic text format provided by the learning system gradually improved their English proficiency in terms of word usage, writing genre, and strategy use than those without syntactic scaffolding.

Moreover, procedural facilitation suggests the accessibility of external support to help students reduce their difficulty in performing the learning tasks (Knudson, 1988) and research suggested that the structure of presentation of instruction and learning materials influence students' learning performance. For instance, in the study conducted by Kundson (1988) to examine the effect of using different structures of instruction, namely the highly structure and less structured lessons, on students' writing performance, students were found to have better writing performance with the less structured instruction due to the fact that students who were given structured facilitation in the process of English writing instruction demonstrated more undetailed information and incomplete sentences in their composition compared to those in the less structured intervention group. That is, structured intervention would negatively influence integrity of writing (i.e., fluency).

Also, the structural presentation of learning materials was also found to significantly influence students' idea generation and creativity. Unstructured presentation of learning materials was found to ease the process of generating ideas and thus facilitated the creativity (Moran, Sawyers & Moore, 1988). That is, it could be expected that structured instructions and materials would decrease students' ability to produce their ideas (i.e., flexibility) compared to those who are given the instructions and materials which are unstructured.

Even though it is evident from existing literature that the structures of presentation of instruction and learning materials have impacts on learning, it is still unclear whether the structures would affect SGQ process. That is, the idea of exploring the different procedural prompts with different structures for SGQ has yet been understood closely. That is, even though it is clear that students can benefit from using procedural prompts for students to generate questions, the effectiveness and affordance of using main idea and what-if-not still need to be clarified in terms of fluency and flexibility in the SGQ process.

#### *1.4 Research Questions*

The aim of the study is to identify the influence of two different procedural prompts, main idea and what-if-not, on the quality of questions students generate. To address the issues already outlined and to begin to fill the gaps in the previous research, the present study was conducted to answer the following research question: Is there any difference of using main idea and what-if-not on students' question-generation performance?

## **2. Method**

A study was designed to explore the comparative effects of two procedural prompts to facilitate the task performance of SGQ. Students were asked to generate three questions based on the main idea and what-if-not procedural prompts, respectively, in two separate sessions. In each session, students were asked to generate three multiple-choice questions with four choices, one correct answer, and explanation.

### *2.1 Participants, Study Context and Study Materials*

The participants in this study were 55 non-English majored freshmen at a university in southern Taiwan. All participants did not have prior experience in SGQ before the experiment. Their English proficiency

level was A2 based on the Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR), and they had the essential computer-related abilities to engage in the online SGQ learning activity.

The instructional materials adopted by the researchers were based on the textbook selected by the participating university for this course, Freshman English. This course is a required course for all freshmen. The selected topic for SGQ was quantity pronouns, and the SGQ task intended to induce students to actually use the grammar, stimulate them to hypothesize, predict, experiment, and reason thoughts, ideas, and explanation (Chin & Brown, 2002) instead of simply memorizing the meaning and usage of the focal concept.

## 2.2 Procedural Prompts and Study Procedures

A study was conducted to examine the comparative effects of two procedural prompts on SGQ task performance. The experiment took two weeks. On the first week, students were given instruction by one of the authors on the targeted grammar (i.e., quantity pronouns) for 50 minutes and on the second week students were given 50 minutes to generate three questions based on the main idea and what-if-not procedural prompts, respectively, in two practice activities. In each activity, students were asked to generate three multiple-choice questions with four choices, one correct answer, and explanation.

## 2.3 The Online Learning System

An online learning system developed by one of the authors, QuARKS (Yu, 2009), was used for the participants to generate questions in the study. In the system, participants can generate questions with different fonts, sizes and styles through the use of tools provided by the system. Also, above the tool, there is a link providing access to the procedural prompts for the participants' reference during question-generation (see Figure 1). Thus, when students generate questions via the main idea procedural prompt, they simply click the link, and the system will direct them to a list of learning objectives/key concepts. Students first did the grammar-related practice and they were guided to review the main idea of the grammar, and then generated questions with the use of main idea procedural prompt (see Figure 2).

On the other hand, the overall procedure of implementing what-if-not procedural prompt is depicted in Figure 3. When participants were asked to generate questions with reference to the what-if-not procedural prompt, they were given access to the practiced questions for question-generation (Figure 4) and then they could change some part of the questions to generate questions. The overall procedure of implementing what-if-not procedural prompt was depicted in Figure 4.

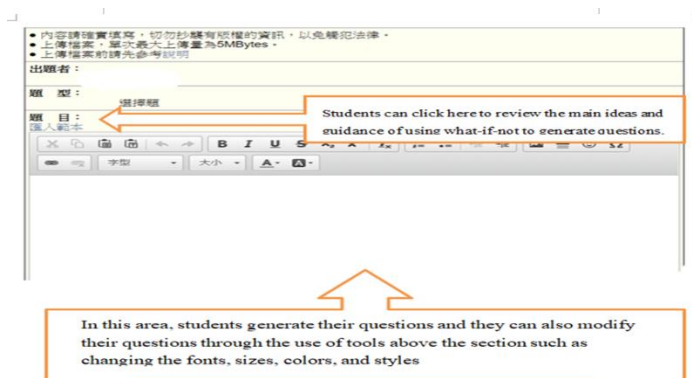


Figure 1. Screenshot of the Area for the Participants to Generate Questions

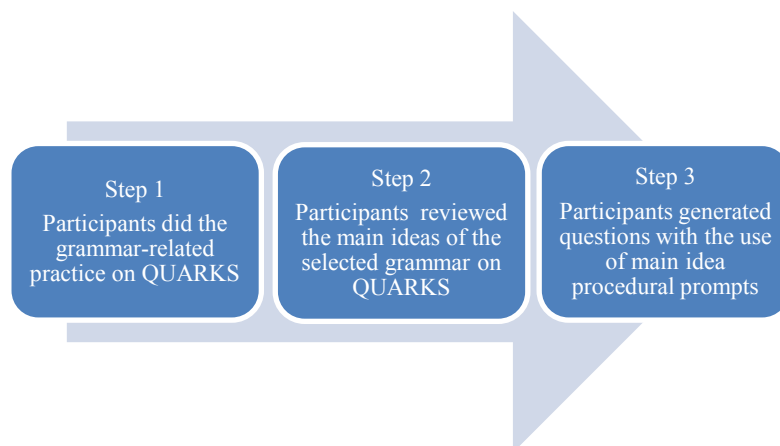


Figure 2. The Procedure of Using Main Idea Procedural Prompt for the Participants to Generate Questions in the Study

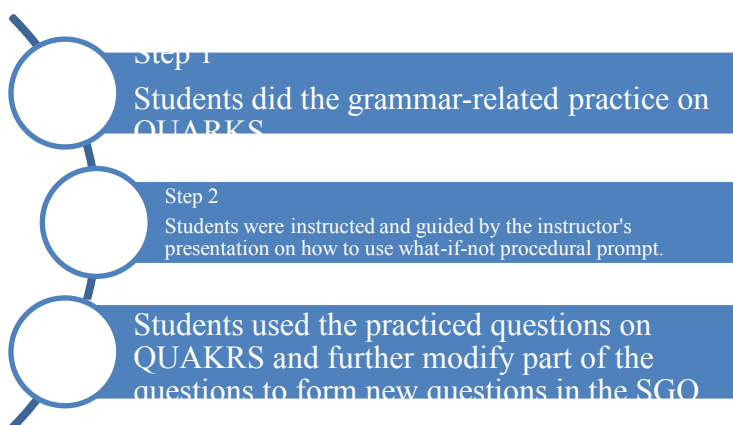


Figure 3. The Procedure of Implementing What-if-not Procedural Prompt for the Participants to Generate Questions in the Study

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		導引清單
語言	導引	導引範例：
1 英文	I bought two _____ of soda for his birthday party yesterday. (1) bags (2) bowls (3) pieces (4) bottles	
2 英文	A: Do you have any pens in your bag? B: Yes, I have _____. (1) any (2) some (3) a little (4) none	
3 英文	I eat _____ bananas when I am hungry. (1) any (2) none (3) a little (4) few	
4 英文	She buys _____ apples every week. (1) some (2) little (3) any (4) much	
5 英文	I am very poor; I don't have _____ money. (1) little (2) few (3) a few (4) a lot of	
6 英文	Did you buy _____ diary products for me? (1) a little (2) some (3) little (4) any	
7 英文	I have _____ friends from America. (1) much (2) some (3) a little (4) any	
8 英文	I like to eat _____ bread for my breakfast. (1) some (2) any (3) little (4) much	
9 英文	I am hungry and I can have three _____ of rice. (1) bags (2) bowl (3) bag (4) bowls	
10 英文	Can I have another _____ of bread? (1) bottle (2) glass (3) piece (4) carton	

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Figure 4. Screenshot of the Practiced Questions on QUARKS for the Participants to Generate Questions with the Use of the What-if-not Procedural Prompt

#### 2.4 Measurements

To examine the effect of two different procedural prompts on the students' SGQ task performance, each of the questions generated by the participants was evaluated against two sets of criteria for the fluency and flexibility index, respectively. The criteria for the fluency index include the correctness of formats, punctuation marks, spelling, grammar, and the answer, the completeness of the question (with four

options, one correct answer, and explanation), the adaption of the procedural prompts in the generated questions, and the appropriateness of the explanation (Yu & Wu, 2013). The criteria for the flexibility index stressed the interconnectedness of the key concepts contained in the questions. Since English grammars instruction is the focus of the practice session, students' generated questions were analyzed with regard to whether the questions assessed (a) the key concepts or (b) related English grammar of the selected English grammar of the present study, (c) included previously taught English grammar, or (d) used English grammars which haven't been taught. The detailed criteria are listed in Table 1.

Table 1. *The Grading Criteria for the Fluency and Flexibility Indices for the Questions Generated by the Participants*

Fluency	1.	The punctuation marks and case of the question are all correct.
	2.	The spelling and grammar of the question are all correct.
	3.	The question is complete with four options, answer, and explanation.
	4.	The answer is correct.
	5.	The question is based on the specified procedural prompt.
	6.	The explanation of the given answer is appropriate.
Flexibility	1.	The grammatical structure of the generated question is based on the intentional core, the core grammar of the lesson in the textbook, namely the quantity pronouns.
	2.	The grammatical structure of the generated question is based on the intention-related core, including tense, voice, subject-verb agreement, particles, pronouns and prepositions.
	3.	The grammatical structure of the generated question is related to the taught grammars in previous lessons in the textbook, such as the infinitives, gerunds, relative pronouns, and conjunctions.
	4.	The grammatical structure of the generated question is not from either the textbook or the instruction but from students' self-learning experience, and are beyond A1 level according to the CEFR, such as the participles and inverted sentences.

### 2.5 Data Analysis

To investigate the effects of the two different procedural prompts on student SGQ task performance, an analysis of paired-sample *t*-tests was adopted. Each of the six generated questions by the participants was evaluated for the fluency index while the three questions generated with the main idea and what-if-not procedural prompts, respectively, were examined as a unit for the flexibility index.

### 3. Results

As shown in Table 2, the quality of the questions generated by the participants using the two different procedural prompts reached statistical difference in terms of fluency,  $t(55)=2.87, p=.006$ ; nonetheless, the flexibility index didn't reach statistically different level,  $t(55)=1.81, p=0.74$ . That is, students using the main idea procedural prompt produced significantly better question quality than using the what-if-not procedural prompt in the fluency index while using main idea and what-if-not didn't show any statistical difference in the flexibility index according the results of the present study.

Table 2. *Paired-sample t-tests Results of SGQ Task Performance with the two Procedural Prompts (n = 55)*

Criteria	SGQ with main idea	SGQ with what if not	<i>t</i>	<i>p</i>
Fluency	4.22	3.47	87	06
Flexibility	2.43	2.12	81	74

Note: The scores used for the paired sample *t*-tests were the average mean of the three generated

questions in terms of fluency and flexibility.

#### **4. Discussion & Conclusion**

The present study is preliminary research comparing the effectiveness of using the main idea and what-if-not procedural prompts on students' SGQ task performance. A major finding is that the participants with the use of main idea procedural prompt when constructing questions performed significantly better than using the what-if-not procedural prompt in terms of fluency, but the participants had similar performance under the two procedural prompts in terms of flexibility.

One possible reason for there being a statistical significance on students' SGQ task performance in terms of fluency may lie in the assigned tasks the main idea procedural prompt involves. For students who were asked to construct questions based on the use of main idea, they first reviewed the main idea of the learning materials and then construct the questions based on the found ideas while what-if-not procedural prompt (Brown & Walter, 1983) consists of structured steps in which students were given explicit instruction on the steps to follow, and According to scaffolding theory, it suggests that the process of SGQ would be more accessible (Swan, 2008) since they are given more guidance in SGQ process but structured intervention was found negatively influence the integrity of students' writing performance (Knudson, 1988). Similar finding was found in the present study. Students with the use of main idea, which is considered more freely generating process, significantly performed better than using what-if-not, which, on the other hand, is considered more structured (Swan, 2008). One possible reason may be that students who are given structured intervention may rely more on following the instruction given by the instruction and the provided procedures of generating questions, which was also found in the study conducted by Knudson (1988), in which students were found to have more "answers to the questions" instead of the detailed information and completed sentences in the writing composition. Much of students' attention may be directed to the steps of generating questions through the use of what-if-not procedural prompt the presentation of which was explicit and students were given clear guidance on using what-if-not. Another possible reason may be that the participants of the present study are familiar with the notion of main idea, which might help them better employ the use of main idea procedural prompt when constructing questions.

According to the literature, unstructured representation would give students more freedom and thus result in better learning performance (Kundson, 1988) and flexibility (Moran, Sawyers & Moore, 1988). The results of the present study are not in contradiction with those of the empirical studies discussed above. With regard to the flexibility of the generated questions by the students, our findings confirm those of Moran, Sawyers and Moore (1988), although the difference doesn't reach the statistically significant level in the present study. These results lend some evidence? to the hypothesis that unstructured representation would contribute to enhancing students' flexibility.

#### **5. The Contributions and Limitations of the Study and Suggestions for Future Studies**

The present findings provided the empirical findings on the effectiveness of using the two different procedural prompts with different structures used in SGQ. One finding is that students with the use of unstructured procedural prompt, the main idea, significantly performed in terms of fluency better than using the structured procedural prompt, the what-if-not procedural prompt; However, the results didn't show any statistical difference on using the two procedural prompts in terms of flexibility.

Since there were only two kinds of procedural prompts used in the present study, future studies could focus on the effectiveness of the other procedural prompts or arrangements on SGQ performance such as question types, story grammar and generic question stems. Other challenges the researchers of the present study faced was that the experiment was conducted in one instructional session, adopting one group of students. Future study could gather the data from participants exposed to different treatment groups on a longitudinal basis.

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