The effect of the SSARC model of task sequencing on L2 written production

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Abstract

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Planning lessons based on task sequencing is considered a problem in task-based language teaching as there is no one-agreed upon theoretical framework to sequence tasks in a way to promote better learning. Robinson's (2010) proposal to sequence tasks based on his Cognition Hypothesis and Triadic Componential Framework gave rise to one of the most researched models to sequence tasks. This model is known as the SSARC (stabilize, simplify, automatize, reconstruct, and complexify) model of task sequencing. Nonetheless, there are not enough studies to empirically support the claims of the SSARC model, and thus, the question whether there is a universal task design that can systematically predict learners' interlanguage development is still not answered. Thus, this study is aimed at exploring the effect of the SSARC model of task sequencing on written language development. The following research question was investigated: Does the SSARC model of task sequencing encourage French L2 students to use new lexical and grammatical forms in writing and will it, in turn, lead to higher accuracy, fluency, and complexity of written production? The study took place in a private elementary school in Lebanon. The participants (n=42) were divided into two experimental groups. The first group (n=21) performed treatment tasks in ascending order of cognitive complexity. The other group (n=21) performed treatment tasks in descending order of task complexity. The participants carried out a pre-test, immediate post-test, and delayed post-test two weeks later. Each test consisted of 4 sections: vocabulary section, spatial expression section, relative pronouns section, and paragraph writing section. Results from mixed ANOVA tests indicated that simple-to-complex group outperformed the complex-to-simple group on immediate post-test and delayed post-test on all measures, except for complexity. Results are discussed in light of Cognition Hypothesis and followed by pedagogical implications for task sequencing in second language context.

Key words: task sequencing, cognitive complexity, SSARC model, simple-to-complex sequence, complex-to-simple sequence.

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Contribution of Authors

As first author for the included manuscript, Elissa Allaw was mainly responsible for the conceptualization, development, data collection, analysis, and writing of the study with the support of Pr. Kim McDonough, who provided guidance and feedback throughout the various stages. During the process, Elissa Allaw developed several drafts and redrafts of the manuscript, with Pr. Kim McDonough supplying extensive feedback on organization and content, as well as rewording some passages. The manuscript's conception and content were developed by Elissa Allaw, which is reflected in her status as first author.

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Chapter 1

Introduction

There has been a considerable amount of research carried out about pedagogic tasks. Tasks are considered an efficient way to promote L2 development and improve linguistic performance (Ellis, 2009). Thus, syllabi based on tasks as units of instruction have emerged worldwide in recognition of the role that tasks play in L2 language production and learning. Despite the fact that tasks are important in language learning, there are still several unresolved issues concerning tasks. First, there is no agreed-upon definition of a task (Baralt, Gilabert, & Robinson, 2014). Second, there is neither precise definition nor systematic criteria to define 'simple' and 'complex' tasks (Bulté & Housen, 2012). Third, there are no agreed-upon criteria to sequence tasks (Robinson, 2007).This manuscript-based thesis aims at exploring in more depth the issue of sequencing pedagogical tasks in such a way that they promote language learning. To that aim, this chapter starts with defining the notion of tasks. Then, the concept of cognitive complexity is approached in more detail explaining why cognitive complexity is considered a pillar in the design and sequencing of pedagogical tasks. Later, the construct of task complexity is covered to illustrate existing criteria for classifying tasks as simple or complex and provide a quick review of current studies on task complexity before moving to Chapter 2, which will provide detailed coverage of the existing body of research on task sequencing.

Task definitions

Real-world tasks are defined as any action that has an outcome such as making hotel reservation, taking children to daycare, or planning a trip (Long, 2014). When these tasks are transformed from the real world to the classroom, they become pedagogical tasks (Nunan, 2006b). Thus, the pedagogical task is defined as a piece of classroom work that engages learners in meaningful communication during which grammatical knowledge is used to serve as a means of conveying meaningful messages (Nunan, 2006b). Tasks are also defined as activities in which learners use the target language for communicative purposes to achieve an outcome (D. Willis & Willis, 2008). Another definition that provides characteristics of a task states that meaning and task completion are essential; pedagogical tasks should be comparable to real-world tasks and these tasks are assessed by their outcomes (Skehan, 1998). Perhaps, the most relevant definition of the task for the present thesis is the one provided by Prabhu (1987, p. 24):

> *A task is an activity which requires learners to arrive at an outcome from given information through some process of thought, and which allows teachers to control and regulate that process.*

No matter how tasks are defined, based on research, their use in a classroom setting has proven to be useful in language teaching (Ellis, 2009) as they activate the complex processes of interaction between thought and language. More explanation is provided in the following section.

Tasks, Cognitive Complexity and Language Learning

Tasks function as a medium to combine form with meaning (Bayat & Biria, 2013; Robinson, 2011) for pedagogical tasks pave the way to the meaningful, interactive and authentic use of a language in a classroom-based teaching (Ellis, 2014).Consequently, teaching language through using tasks triggers better L2 language production (Calvert & Sheen, 2014) and that therefore leads to better language learning (Ellis, 2014). Not only do tasks promote language production, but also the act of producing language in itself is a valuable factor in language learning. Language learning occurs when learners attend to meaning, rather than to form (Prabhu, 1987).When students perform a sequence of tasks, they encounter various cognitive and linguistic challenges that stretch their interlanguage and promote more language production during the mitigation process to achieve the objective of the task (Baralt, Harmath-de Lemos & Werfelli, 2014; Robinson, 2011). Language production strengthens form-meaning connections, which directly aids the process of automatization (Reinders, 2009; Swain, 1985). In other words, research has shown that tasks are the most effective means to engage the complex learning processes while using language (Baralt, Harmath-de Lemos&Werfelli, 2014; Ekuni, Vaz & Bueno, 2011).

More specifically, our understanding of tasks' importance for language learning comes from cognitive research into information processing. Language learning is seen as a process that involves an interaction of input with cognitive processes that results in different levels of understanding ranging from surface understanding to thorough or deep understanding (Anderson, Krathwohl, & Bloom, 2001). Thus, deep processing of information that results in more durable and sustainable learning (Ahmadi&Nazari, 2014) is referred to as cognitive complexity. The task that imposes deep processing of information makes high reasoning demands; that is, cognitive complexity. Likewise, retention is dependent on the depth to which information is processed: deeper processing results in greater retention (Ekuni, Vaz & Bueno, 2011).

Moreover, research has revealed that manipulating the cognitive complexity of tasks not only facilitates language production but also leads to more extensive noticing, a greater amount of uptake, and long-term retention of input that facilitates uptake (Robinson &Gilabert, 2013). Uptake is defined as a partial incorporation by the learners of the input into their production, especially in the context of the effects of teacher feedback on language learners' production (Reinders, 2009). Providing explicit recasts during the performance of more complex tasks leads to more uptake compared to simpler tasks (Révész, 2009; Baralt, 2010). Hence, manipulating the cognitive complexity of tasks not only improves language production but also leads to longer retention of information that may lead to uptake. However, creating tasks with different levels of cognitive complexity raises the question of what makes a task simple or complex. To answer the question about task complexity, it is important to understand the relationship between task complexity and cognitive complexity. The concept of task complexity is covered in the following section.

Task Complexity

Task complexity as a construct either goes undefined in many studies or is used in vague terms (Bulté & Housen, 2012). Addressing the problem of task complexity, several attempts to set a reliable framework to classify or grade task based on the degree of task complexity have emerged. Task complexity is manipulated according to three dimensions: language required, the thinking required, and the performance conditions (Skehan, 1998) (see Table 1). Thus, task complexity can be related to code complexity, cognitive complexity or/and communicative stress (Skehan, 1998). Code complexity depends on the language needed to accomplish a task in terms of its structure and lexical diversity. Cognitive complexity is determined by cognitive processing required to complete the task and by the cognitive familiarity of task type, discourse genre or topic. Communicative stress is determined by time pressure, type of interaction, and participants involved.

Table 1

Skehan's (1998) Analysis of task complexity

Type of Complexity	Factors that affect task complexity
1- Code Complexity	Linguistic complexity and variety Vocabulary load and variety Redundancy and density
2- Cognitive Complexity	
a- Cognitive familiarity	Familiarity of topic and its predictability Familiarity of discourse genre Familiarity of task
b- Cognitive processing	Information organization Amount of computation Clarity and sufficiency of information given Information type
3- Communicative Stress	Time limits and time pressure Speed of presentation Number of participants Length of texts used Type of response Opportunities to control interaction

Another noteworthy definition of task complexity is illustrated by Ellis' (2003) proposal. However, before introducing his proposal, it is important to clarify that Ellis used the term easy/difficult interchangeably with simple/complex. To clarify, task complexity refers to the cognitive demands a pedagogical task imposes on learners, whereas task difficulty is related to procedural task performance and how learners perceive the task (Robinson, 2007). Thus, task complexity differs from task difficulty. In this respect, task is classified as either simple or complex according to the nature of the input provided in the task, conditions under which the information is presented to learners, the nature of the cognitive processes that the task requires, and the outcomes resulting from performing the task (Ellis, 2003) (see Table 2).

Table 2

Ellis' (2003) criteria to task grading

Criterion	Easy	Difficult
Input		
- Info type	Pictorial-written	Oral
- Amount of information	Static- Dynamic	Abstract
- Degree of structure	Few elements	Many elements
- Context dependency	Well-defined	Little structure
- Familiarity	Here-and-now Familiar	There-and-then unfamiliar
Conditions		
- Interactantrelationship	Two-way	One-way
- Taskdemands	Single task	Dual task
- Discourse mode	dialogic	monologic
- Processes		
Cognitive operations	Exchanging information	Exchanging opinions
- Reasoning needs	Few steps involved	Many steps involved
Outcomes		
- Medium	Pictorial	Written –oral
- Scope	Closed	Open
- Discourse mode	Lists, narratives, classification	Instructions, arguments

All these frameworks that determine the degree of task complexity have one component in common: cognitive complexity. Hence, there is a consensus among researchers such as Skehan, Ellis, and Robinson to operationalize task complexity by the cognitive demands the task imposes on the learners.

Robinson's Cognition Hypothesis and Triadic Componential Framework

Since cognitive complexity determines task complexity, then it is logical to sequence tasks from cognitively simple tasks to cognitively more complex tasks. This hypothesis is known as Cognition Hypothesis (Robinson, 2015). In other words, Robinson proposes to sequence tasks from simple task to its more complex version where each version of the task differs in only one aspect from the previous task, providing learners with an opportunity to develop linguistic automaticity through the procedural repetition. The Cognition Hypothesis is operationalized in terms of the Triadic Componential framework (see Table 3) along resource-directing and resource-dispersing variables within task complexity (Robinson & Gilabert, 2007). On the one hand, resource-dispersing variables impact linguistic performance without guiding attention to particular form-meaning mappings and impose procedural demands on cognition consolidating fast access to existing interlanguage resources (Robinson, 2011). On the other hand, resource-directing variables require learners to be able to accomplish their tasks successfully, that is, using understandable language. Consequently, both resource-directing and resource-dispersing dimensions play a complementary role in facilitating language production. In this thesis, task complexity is viewed as a way to operationalize task sequencing and a way to define the notion of 'simple' and 'complex' tasks. It is important to clarify that simplicity of a task is measured in comparison to its more challenging version where a simple task is not necessarily, by default, to be considered a simple task from the learner's perspective. However, the teacher's role, as well as the role of the peers, is to scaffold learner's performance so that it meets the standards of successful negotiation of meaning.

The Triadic Componential Framework combines three task components that contribute to language learning: task complexity, task condition, and task difficulty. This framework illustrates how task complexity can be manipulated through an interaction of resource-directing factors and resource-dispersing factors (Robinson, 2007). The more cognitively demanding the tasks are, the more attention will be directed to input making it more salient which, in turns, will increase learning mechanisms that promote greater analysis, modification, and restructuring of the interlanguage system. The second component of the framework, which is task condition, refers to the interactive characteristics of tasks, which include participation variables (open vs. closed-tasks) and participant variables (participants' familiarity). The third component is task difficulty. It refers to the L2 learner's perceptions of difficulty that are dependent on the level of task complexity and L2 learner's individual differences such as their ability (aptitude, intelligence and proficiency), as well as affective variables (processing anxiety and task motivation). Only the first component, task complexity, is related to task sequencing (Robinson, 2010).

Table 3

The Triadic Componential Framework for task classification (from Robinson & Gilabert, 2007)

Task Complexity (cognitive factors)	Task Condition (interactive factors)	Task difficulty (learner factors)
resource-directing	participation variables	Ability variables and task-relevant resource differentials
± Here-and-Now	± open solution	h/l Working memory
± few elements	± one-way flow	h/l Reasoning task-switching
± spatial reasoning	± convergent solution	h/l Aptitude
± causal reasoning	± few participants	h/l Field dependence
± intentional reasoning	± few contributions needed	h/l Mind/intention-reading
± perspective taking	± negotiation not needed	
resource-dispersing	participant variables	Affective variables and task-relevant state-trait differentials
± planning	± same proficiency	h/l Openness to experience
± single task	± same gender	h/l Control of emotion
± task structure	± familiar	h/l Task motivation
±few steps	± shared content knowledge	h/l Processing anxiety
± independency of steps	± equal status and role	h/l Willingness to communicate
± prior knowledge	± shared cultural knowledge	h/l Self-efficacy

Regarding research in this area, most task-based research that has explored the effect of task complexity on language production has focused on oral production with little attention to written language production (Frear & Bitchener, 2015; Jackson & Suethanapornkul 2013; Ong &

Zhang, 2010). These studies have sequenced tasks from simple to complex along resource-directing and resource-dispersing dimensions of tasks and yielded different results on complexity, accuracy, and fluency of written language production. For example, increasing task complexity on the [± here-and-now] dimension increases the accuracy, complexity, and fluency of a written language production (Ishikawa, 2007). However, task complexity along the [± few elements] dimension exhibits more accurate performance at the expense of fluency and complexity (Kuiken &Vedder, 2007, 2008, 2012). Task complexity contributes to lower ratios of lexical errors in the more complex task (Kuiken &Vedder, 2007). Manipulating reasoning demands [± reasoning demands] in narrative tasks leads to more complex written production (Niwa, 2000; Salimi, Dadaspour &Asadollahfam, 2011). As for the presence of planning dimension [± planning] during task performance, greater fluency and lexical complexity emerge (Ong & Zhang, 2010). There is no study that investigated +/-spatial reasoning dimension in written production. In sum, the existing empirical research on written production suggests that increasingly cognitive demands through manipulating resource-directing and/or resource-dispersing dimensions of a task induce improved linguistic performance on fluency, accuracy, and/or complexity during task-based work. However, it is worth mentioning that the studies mentioned above compared simple tasks with their complex versions; they did not sequence them (Malicka, 2014). Despite the positive influence that cognitive complexity exerts on tasks, these studies were criticized for not providing a grounded basis for defining simple versus complex tasks. Thus, due to the absence of one agreed-upon criterion for task sequencing in language teaching, this study aims at contributing more to the field of task sequencing in an educational setting.

Chapter 2

The SSARCmodel of task sequencing and L2 written production

Despite the fact that tasks are important in language learning, several challenges exist when it comes to planning a task-based lesson as there is neither consensus on task definition, nor criteria to sequence and classify tasks. Sequencing pedagogic tasks is considered one of the main challenges in designing and implementing tasks (Ahmadi & Nazari, 2014; Baralt et al., 2014; Nunan, 2006a). There is no one agreed-upon grounded empirical or theoretical driven model of task sequencing on which teachers can rely to sequence their tasks (Robinson, 2015). As a result, several approaches to task sequencing have been proposed and empirically tested. These approaches are presented in the following section.

Literature Review

Approaches to Sequencing Tasks

The history of task sequencing started with Candlin's (1984) proposal to construct syllabus based on negotiation between the teacher and the learners and Prabhu's (1987) proposal to sequence tasks based on the amount of challenge potent in each task; that is, the cognitive demands a task imposes on learners. Since predetermined syllabuses and sequencing are ineffective, tasks should be chosen by the teacher and students based on their needs (Candlin, 1987). Thus, tasks take the form of problem-solving activities where learners use language to express their thoughts and beliefs. This approach to implementing and sequencing tasks in the classroom was criticized for being not feasible in many instructional contexts, mainly because it redefines the concept of power in the classroom and because it does not offer any practical recommendations for sequencing tasks. Within a TBLT framework, the Bangalore

Communicational Teaching Project (Prabhu, 1987) was the first attempt to provide recommendations for sequencing tasks so that they lead to L2 acquisition. Prabhu (1987) suggests that each lesson starts with a pre-task phase to present and demonstrate the lesson by a teacher in front of the whole class. Then, the main task is performed, individually or in groups, in the form of information-gap activities, opinion-gap activities, and reasoning-gap activities (Prabhu, 1987; Long & Crookes, 1992). Next, the teacher checks the students' work and gives them some feedback on their accuracy in performing the task, rather than their accuracy in producing correct sentences.This approach to language teaching was revolutionary in the sense that the pedagogical focus was mainly on successful task completion rather than on the linguistic performance. Hence, based on learners' performance, the teacher sequences the next task, which is supposed to be harder than the preceding one. In other words, tasks are sequenced based on increasing task complexity. Task complexity, according to Prabhu, was determined by teacher's assessment of learners' performance. Therefore, a task was considered challenging if approximately half of the students in the class were successful in doing half of the task (Prabhu, 1987). However, this criterion for grading and sequencing tasks, as described by Prabhu, was intuitive and based on teacher's decisions about whether and to what degree tasks were complex (Long & Crookes, 1992; Robinson, 2007). Prabhu's definition of task complexity did not state what makes one task more simple than another; therefore, it was not clear how to present learners with more complex task versions (Baralt, Gilabert & Robinson, 2014).

It was the teachers' role to perform a needs analysis and come up with target tasks that represented real-world tasks. Then, teachers broke down target tasks into several pedagogical tasks and increased their complexity on subsequent versions while approximating the target tasks (Long & Crookes, 1992, 1993). Later, pedagogical tasks were operationalised in terms of task cycles of pre-task, main-task, and post-task (Nunan, 2006b; J. Willis, 1996). Willis' (1996) widely-used framework comprises three components: pre-task, task cycle, and the language focus. In the pre-task phase, the students understand the objectives of the task. The teacher activates their prior knowledge and provides useful information to prepare students to accomplish the main task successfully. During the task cycle, students work in pairs or groups to do the task and then they report to the whole class what their outcome was. Finally, in the language focus phase, students do some language-focused work. Other proposals for task-based syllabi involve sequencing tasks according to linguistic criteria, so as to promote awareness of grammatical structures or lexical items (Nunan, 2004). According to this model, tasks that focus on tenses should be introduced before tasks that aim at teaching conditionals. However, there is no clear rationale for favoring instructing some aspects of language over another (Long 1991; Long & Crookes, 1992; Robinson, 2009). Moreover, classifying the complexity of grammatical aspects from simple to more complex is a matter of intuition rather than empirical evidence (Baralt, Gilabert & Robinson, 2014). Furthermore, language is not acquired in a linear way; language acquisition takes place in a dynamic, complex and organic way (Long 1991; Long & Crookes, 1992; Larsen-Freeman, 2006). Once again, it was left to teachers' intuitions to decide when each stage starts and ends and what to include in each stage. The problem with these attempts to sequence tasks resides in the fact that there was no empirical or theoretical basis for them. Instead, pedagogical tasks rely heavily on implementing linguistic syllabi. Thus, this approach is no more than combining tasks with grammar teaching (Robinson, 2012).

Although there is an agreement to sequence tasks based on task complexity, it is still not clear what is meant by 'simple' task and how it is possible to make another more complex version of the same task or what determines the difference in degree of difficulty between two versions of the same task. The most comprehensive approach to task complexity is determined by cognitive complexity (Ellis, 2003; Skehan, 1998; Robinson, 2010, 2015). More complex tasks require more attentional resources (Skehan, 1998). As a result, learners will produce more complex and fluent language at the expense of accuracy since they are not able to attend to form while they are focusing on communicating meaningful ideas. Regarding sequencing tasks, this proposal claims that tasks should be sequenced from less cognitively demanding to more cognitively demanding tasks to optimize opportunities for allocating attention to language features. This model of task sequencing is framed within Skehan's (1998) Trade-Off Hypothesis. Tasks can be sequenced from simple to complex by determining what is simple first and later designing a more complex version of the task according to Ellis' (2003) criteria of grading tasks. For example, the difficulty of the input provided in a task is determined by the medium of input (written input is easier than oral input), code complexity (vocabulary and sentence structure), cognitive complexity (information type, its amount, and topic familiarity). Conditions in which the information is provided are manipulated by interactant relation (two-way communication is easier than one-way communication), task demands (single or dual), discourse mode (dialogic tasks are easier than monologic tasks). Mental processes are manipulated by the load of cognitive operations and their types and reasoning needs as well. The last criterion is manifested by outcomes resulting from the task, such as medium, scope and discourse mode. These criteria serve as a basis for distinguishing simple from complex tasks and they are useful for task sequencing (Ellis, 2003). In the same vein, The Cognition Hypothesis is in line with sequencing tasks according to increases in their cognitive complexity (Robinson, 2001, 2003, 2005, 2011). In sum, Robinson (2001, 2003, 2005, 2010) has narrowed down Ellis' proposal to restrict task complexity to account only for the cognitive complexity of a task, rather than task complexity, input, conditions, and outcomes. Due to the growing research into the effects of task complexity within the Triadic Componential Framework as guided by the Cognition Hypothesis, sequencing tasks based on their cognitive complexity is considered one of the most systematic, theory-based and empirically-driven approaches that are still under investigation.

Two trends of sequencing tasks within Cognition Hypothesis research have appeared. The first trend was directed towards a dichotomous comparing performance of a simple task with its complex version on language production and uptake (Malicka, 2014). Most research focused on juxtaposing simple tasks with their more complex versions by manipulating either resource-directing or resource dispersing dimensions of task complexity (Baralt, 2013; Kim, 2012; Kim & Tracy-Ventura, 2011; Révérz, 2009). The second trend, which is relatively new to task sequencing, was manifested by Robinson's (2010, 2015) explicit recommendation to sequence tasks based on a gradual increase in cognitive task complexity along resource-directing and resource-dispersing dimensions of task complexity. Robinson considers the component of cognitive complexity in the Triadic Componential Framework the most important component because it contributes to task sequencing. Manipulating task complexity dimensions leads to faster access to and control over what learners already know and promotes better mapping of form and concept (Robinson, 2010, 2015). Consequently, better learning will result from the deep processing of new information (Ahmadi & Nazari, 2014). In sum, the Cognition Hypothesis combined with the Triadic Componential Framework gives rise to two important and basic principles for task sequencing that will be covered in the next section. The first principle of task sequencing states that only the cognitive demands of tasks are sequenced (Robinson, 2010, 2015). The second principle states that cognitive complexity is increased on resource-dispersing dimension first, and then it is increased on resource-directing dimensions.

These two principles are operationalized in terms of three steps. The first step of task sequencing starts with stabilizing the current interlanguage system and simplifying the input. The second step involves automatizing the access to the needed information. The third step constitutes reconstructing the new information and complexifying the interlanguage through the creation of new form/meaning connections (see Table 4). These steps are represented in a systematic model called the Stabilize, Simplify, Automotize, Reconstruct, and Complexify model, abbreviated as the SSARC model. Not only does the SSARC model propose a concrete approach to task sequencing, but it also serves as a practical guide for involving learners in deep processing of information.

Table 4

The SSARC Model

	SSARC Model	
Step 1	Stabilize and simplify (SS)	$i \times e\,[('s'rdisp) + ('s'rdir)]^{n}$
Step 2	Automotize (A)	$i \times e\,[('c'rdisp) + ('s'rdir)]^{n}$
Step 3	Reconstruct and Complexify(RC)	$i \times e\,[('c'rdisp) + ('c'rdir)]^{n}$

Where i stands for current interlanguage state; e = mental effort; 's' = simple task demands; 'c' =complex task demands; rdisp = resource dispersing dimensions of tasks; rdir = resource-directing dimensions of tasks; and n = potential number of practice opportunities on tasks.

The SSARC model and task sequencing

According to the SSARC model, a task that is characterized by +/- here-and-now (resource-directing dimension) and by +/- planning time (resource-dispersing dimension) will be sequenced as it is represented in Table 5. Thus, the task that has characteristics of +/- planning time and +/- here-and-now is sequenced into three steps; each step is performed on separate days or is performed from the simple to complex version. This model also shows how it is possible to make learners deeply process the information they get. First, start with a simple task on all cognitive dimensions: (+planning time, +here and now). Thus, task performance draws on the simple, stable state of current interlanguage. Next, complexity on resource-dispersing dimensions is increased (-planning, + here-and-now). This promotes speedier access to the current interlanguage system which leads to automatization of information retrieval. Finally, complexity on both resource-dispersing and resource-directing dimensions is increased (-planning, - here-and-now), leading to restructuring of the current interlanguage system and the development of new form-function/concept mappings.

Table 5

Example of task sequencing

	Level of task complexity		
	Simple	Medium	Complex
+/- here-and-now (resource directing)	+	+	-
+/- Planning time (resource-dispersing)	+	-	-

Studies related to the SSARC model

Not until recently had researchers shifted their attention from a dichotomous comparison of simple versus complex tasks to gradual increases in task complexity (Levkina, 2014; Malicka, 2014; Thompson, 2014). Their work was motivated by the emergence of Robinson's SSARC model (2010). Nevertheless, and despite Robinson's explicit recommendation to sequence tasks following the steps proposed in the SSARC model, researchers such as Levkina and Malicka designed studies that partially tested the SSARC model because they sequenced their tasks along the resource-directing dimension only. The simple version of the task was manifested in the absence of the task complexity dimension, the more complex version was modified to include that dimension, and the most complex version involved adding another resource-directing dimension. For example, Levkina and Gilabert (2014) looked at the effects of task sequencing on L2 language production and working memory capacity within the SSARC model. They investigated the immediate and delayed effects of three different types of sequences: simple to complex, complex to simple, and random on the development of spatial relations by 43 adult Catalan learners of English as a foreign language. Their study followed a pre-test, post-test and delayed post-test design where cognitive complexity was operationalized in terms of +/- spatial reasoning (presence or absence of space references) and +/- perspective taking in an oral task of room furnishing. The study measured the use and retention of spatial expressions after treatment immediately and two weeks later. Results suggested that learners in the simple-to-complex sequence showed more sustained productive and receptive learning over time compared to the complex-to-simple sequence. However, the complex-to-simple sequence showed more retention and use of spatial expressions in the immediate post-test. Levkina and Gilabert's (2014) study confirmed the predictions of the SSARC model for more effective use of resources and higher retention of input. It is worth mentioning that although they sequenced tasks according to a gradual increase in task complexity in their design, task complexity was manipulated along the resource-directing dimension only (see Table 6).

Table 6

Task sequencing in Levkina and Gilabert's (2014) study

	Level of task complexity		
	Simple	+Complex	++Complex
+/- spatial reasoning (resource directing)	-	+	+
+/- perspective taking (resource-directing)	-	-	+

Another study that partially tested the SSARC model was Malicka's (2014) study. Her results should be generalized with caution when it comes to evaluating the efficacy of task sequencing because her study focused on sequencing tasks only along resource-directing dimensions (see Table 7). She explored short-term effects of simple-complex task sequencing. In the sequencing group (n=60), half of the participants were classified as high proficiency and half as low proficiency. Task complexity was operationalized in terms of resource-directing variables +/- number of elements (client profiles, hotel or room options) and +/- reasoning demands (build-up of mental operations such as describing, recommending, apologizing, and justifying). The participants carried out three monologic oral tasks of increasing task complexity in the context of the hotel reception. In the simple version of the task, the participants needed to describe the different options offered by the hotel. In the more complex version, the participants needed to make a decision about which room option best matches the clients' profiles. Malicka found that task sequencing had no effect on language performance. That is, regardless of the order in which the tasks were done, the performance of complex tasks increases accuracy and lexical complexity, but not fluency and structural complexity.

Table 7

Task sequencing in Malicka's (2014) study

	Level of task complexity		
	Simple	+Complex	++Complex
+/- reasoning demands (resource-directing)	-	+	+
+/- number of elements (resource directing)	-	-	+

Another study that tested the SSARC model on the resource-directing variable, +/- intentional reasoning was Baralt's (2014) study. Baralt's research question focused on investigating the impact of task sequencing on language-related episodes in relation to Spanish past subjunctive in both oral face-to-face contexts and computer-mediated communication, chat environment. Ninety-four students of intermediate-level Spanish at a public university in the United States participated in a study. The study used a pre-test, post-test and delayed post-test design in which the participants performed both simple and complex oral and written tasks in one of four sequences: simple-simple-complex, complex-complex-simple, complex-simple-complex, and simple-complex-simple. Three narrative retelling tasks were operationalized in terms of +/- intentional reasoning. In the simple version, characters' intentional reasons were already provided on small cards, in their L1. In the complex version of the task, cards contained yellow thought bubbles that prompted learners to think about characters' intentions. Baralt found that more complex tasks lead to a higher number of Spanish subjunctive language-related episodes regardless of the sequence. She proposed that task sequencing should be operationalized in a U-shaped manner or in a discontinuous manner rather than in an increasing cognitive complexity. She also suggested that in computer-mediated communication there is no effect for either cognitive complexity or sequencing. It is worth mentioning that Baralt operationalized task complexity along resource-directing variable in a combination of different sequences of simple and complex tasks rather than sequencing them according to a gradual increase in task complexity from simple to complex to more complex tasks, which renders her findings not representative of the SSARC model of task sequencing.

Perhaps, the only study that investigated the effect of the SSARC model of task sequencing on language production was the study conducted by Lambert and Robinson (2014). Their longitudinal study investigated the impact of task complexity mediated by proficiency level and working memory on Japanese students' written narrative summaries based on comic strips. They used a quasi-experimental pre-test, post-test design where the participants were divided into two groups: the experimental group had a simple-to-complex sequence according to the principles of the SSARC model, and the control group was sequenced according to no particular principles for task sequencing. Task complexity was operationalized along resource-directing variables: +/-number of elements and +/-intentional reasoning demands) and along resource-dispersing variables +/-planning time, +/-prior knowledge, +/-number of steps and +/-multi-tasking. Although Lambert and Robinson concluded that no significant differences were found in terms of structural complexity and accuracy between the groups, they observed that the simple-to-complex group showed a higher gain percentage over time from pre- to post-test. They ended up saying that the SSARC model is a feasible model for educational planning. However, implementing so many variables along both task complexity dimensions at a time renders the validation process of the results difficult. Moreover, engaging so many variables makes tasks very complex for the students in an experimental group compared to the control group that performed tasks that did not follow any sequence. Table 8 presents a summary of all studies carried out on task sequencing.

Table 8

Studies that tested the SSARC model of Task Sequencing

	Levkina&Gilabert (2014)	Malicka (2014)	Baralt (2014)	Robinson & Lambert (2014)
participants	43	60	94	120
Target language	English	English	Spanish	English
L1	Catalan	Catalan	English	English
Level	Intermediate	Low/high proficiency	intermediate	English majors
Task type	Oral	Monologic Oral	Oral retelling Written retelling	Written summary
Design of the study	Pre-test/post-test	experimental	Pre-test/post-test	Quasi-experimental pre-test/post-test
Independent variables	-spatial reasoning -perspective taking	- number of elements -amount of reasoning	-intentional reasoning	# of elements/intentional demands/planning time prior knowledge/ # of steps/multi-tasking
Dependent variables	Spatial expressions	General CAF measures	Past subjunctive	Syntactic complexity/ Intentional reasoning /markers/grammatical accuracy/task performance
Contribution	Simple-to-complex sequence shows higher and sustained learning	No effect for task sequencing on performance	Random sequence with more complexity produced more LREs	SSARC is a feasible model for educational planning
Criticism	Manipulation of	Manipulation	Manipulation	Manipulation of so many

	resource-directing variable only	of resource-directing variable only	of resource-directing variable only	variables along resource-dispersing and resource-directing variables

Purpose of the study

As is clear from the literature review, the simple-to-complex sequence leads to higher and more sustained learning gains, whereas other sequences such as complex-to-simple and U-shaped sequence results in better retention of target language forms in the short term. It is also noteworthy that only Lambert and Robinson's (2014) study sequenced their tasks along resource-directing and resource-dispersing variables as outlined in the SSARC model. The rest of the studies sequenced their tasks along resource-directing variables only such as Levkina (2014), Malicka (2014), and Baralt's (2014) studies. The importance of following steps as proposed by Robinson (2010, 2015) lies in the fact that the SSARC model serves as a rationale for language learning. Increasing task complexity along resource-dispersing variable first leads to speedier access to a newly learned item, and then its retrieval. Moreover, increasing complexity along resource-directing variable later leads to restructuring of the current interlanguage and thus making it more complex through creating a link between form and meaning. Thus, there is a need to conduct more research on the effect of task sequencing using the SSARC model, that is using simple-to-complex sequence along resource-directing dimensions (conceptual demands of the task) and resource-dispersing dimensions (performative/procedural demands of a task), as a systematic framework on written language production. Since the recent findings of the studies conducted on the SSARC model of task sequencing (Levkina, 2014; Malicka, 2014; Robinson, 2011) suggest that other sequences such as complex-to-simple sequence and U-shaped sequences may yield potentially beneficial effect on second language development, the present study adopted two types of sequencing; a simple-to-complex sequence and a complex-to-simple sequence. These two sequences were chosen according to the recommendation of the SSARC model. Moreover, only two of the studies explored the effect of the SSARC model in a written mode: Baralt's (2014) study and Lambert and Robinson's study. The rest of the studies focused on oral language production. Finally, only Baralt (2014) conducted her research on Spanish L2 production; the rest of the studies conducted their research in English L2. Thus, it is important to conduct more research on more languages to ensure external validity of the results so that they can be generalized to other populations and other learning circumstances.

In sum, due to the limited number of research studies on the effect of the SSARC model on language production, this study explores the effect of the SSARC model of simple-to-complex as opposed to complex-to-simple task sequencing in a French L2 context. This study is also motivated by the limited number of studies on written production and by the absence of studies in a French L2 context. The research question was as follows: Does the SSARC model of task sequencing encourage French L2 students to use new lexical and grammatical forms in writing and will it, in turn, lead to higher accuracy, fluency, and complexity of written production? Based on the claims of the SSARC model of task sequencing (Robinson, 2010, 2015), it is predicted that manipulating task complexity along resource-directing and resource-dispersing dimensions will lead to greater use of new lexical and grammatical forms and higher accuracy, fluency, and complexity.

Method

Participants and instructional setting

The participants were students at a prestigious private elementary school (grades 1 to 9) in Lebanon. They were in two French classes for grade 8 students, with a mean age of 13.32 ($SD = .43$). The students (18 males and 24 females) have not taken any standardized French proficiency exams; however, the school considers them to be at A2 in the Common European Framework of Reference of Language. They understand basic written and spoken phrases and sentences within a range of high-frequency vocabulary. They can read and produce short simple sentences and exchange basic and routine information on familiar topics. All students in the class carried out the research tasks; however, two inclusion criteria were applied to ensure comparability across groups in terms of French proficiency. First, only student who had studied in the school for a minimum of four years (since grade 4) were included in the analysis. This ensured that all the participants would have received the same type of French instruction. Second, only students who scored at least 75% on the French final exam in the preceding year were included. Consequently, the data from 42 students were included in the study. The French exam in the school aims at testing the students' writing, reading, and dictation skills and their grammar knowledge. The participants take 5 hours of French language per week, distributed as follows: 2-hour grammar class, 2-hour writing class, and one-hour dictation class. The main focus of French language classes in the school is on grammar. Students start writing paragraphs by the end of grade 7; therefore, at the beginning of grade 8, the students can write basic paragraphs in French and short essays, but without the use of rhetorical devices. Mainly, they learn how to elaborate and express their thoughts in French. The teacher who participated in the study has thirteen years of experience teaching students at this grade level.

Target structures

This thesis explored students' use of new lexical and grammatical structures when writing in French. The target lexical and grammatical structures were nature vocabulary, spatial expressions, and relative clauses (see Table 9). These forms were selected because they were a language focus in the regular textbook À *la croisée des texts livre unique*, EB7, specifically in unit 5, which was about the theme of nature. Although the forms were highlighted in the textbook, there were few activities for students to practice and produce these structures. The teacher introduced the target structures following her normal instructional routine using the explicit information provided in the textbook.

Table 9

Target structures

Target structures	Examples
Spatial expressions	En haut, en bas, en face de, entre, à gauche, à droite, au long de, entouré par, à cote de, au-dessus, au-dessous, derrière, dedans, parallèle, au milieu de, au centre de, devant, au fond, sous, sur
Theme-related vocabulary	plantes, décoratives, le banc, le toboggan, la balançoire, le cycliste, la fontaine d'eau, la piste, cyclable, le gazon, le jardin, la clôture, les arbres, touffus, l'aire de jeux, le nuage, le bois, la trottinette, la colline, lever du soleil.
Relative pronouns	Qui, que, dont, où.

Design

The study adopted a mixed design to test the effect of within- and between-groups factors on students' use of new lexical and grammatical forms. The within-groups variable was time, which had three levels: pre-test, immediate post-test, and delayed post-test. The between-subjects variable was task sequencing with two levels: increasing task complexity sequence and decreasing task complexity sequence. The increasing task complexity sequence group performed low-, medium-, and high- complexity tasks respectively. The decreasing task complexity sequence group performed high-, medium-, and low- complexity tasks respectively. The classes were randomly assigned to one of the two task complexity sequences. The task complexity sequence was manipulated by creating varying levels of spatial reasoning along the resource-directing dimension and task-structure along the resource-dispersing dimension (see Table 10). The dependent variables were students knowledge and use of the new target structures and the fluency, accuracy, and complexity of their written production. To supplement the main analysis, questionnaire data was analyzed to determine how students perceived task complexity.

Table 10

Task Sequencing following the SSARC model

	Low-complexity task	Medium-complexity task	High-complexity task
Spatial reasoning (resource-directing)	Location of the objects is given in a picture	location of the objects is given in a picture	location of the objects is not given (no picture)
Task structure (resource-dispersing)	Paragraph format and guidelines are given	No paragraph format and guidelines	No paragraph format and guidelines

Materials

The materials that were used for the study were tests, treatment tasks, and a task perception questionnaire for the students.

Tests: Three similar versions of tests were created to be used as pre-test, immediate post-test, and delayed post-test to assess the students' knowledge and use of the target structures. These tests were administered in different orders in each group. The three tests consisted of three parts: writing, vocabulary, and grammar. The writing part involved describing a picture of a natural scene. The paragraph writing tasks in pre-test, immediate post-test, and delayed post-test aimed at tracking any improvement in written production in terms of accuracy, complexity and fluency. The vocabulary part had two fill-in-the-blank sections that tested the knowledge of the target vocabulary and spatial expressions. The form of the test was inspired from the controlled productive Vocabulary Level Test available on Lextutor software (www.lextutor.com), software to analyze word occurrences in English and French corpora. This test was originally developed by Lauffer and Nation (1999) to test the degrees of vocabulary knowledge based on frequency levels. The test in the present study consisted of a set of meaningful sentences where the context and the first letters of the French target vocabulary were provided. Here is an example eliciting the word 'infermier'.

Ella travaille comme inf………. à l'hôpital.

The rationale for providing the first letters was to prevent the test takers from providing other semantically appropriate words that could fit in the context. The vocabulary section had 20 target theme-related vocabulary items ($\alpha = .79$) and the second section contained 20 target spatial expressions ($\alpha = .85$). The grammar section contained 20 fill-in-the-blank items ($\alpha = .81$); 12 of the items were the target structures and 8 of them served as distractors so that students would not figure out what the target structure was. The vocabulary and grammar test aimed at indicating whether any learning of the new items occurred. One of the tests is provided in Appendix A.

Treatment tasks: The treatment consisted of three paragraph-writing tasks in which students described a natural scene. In order to create different levels of complexity (low, medium and high), the tasks differed in terms of presence or absence of the picture and in terms of presence and absence of a task structure. The low-complexity task asked students to write a paragraph relocating items in the playground picture to the playground territory (a template).The purpose of providing an empty template was to activate the students' imagination about designing a playground. Mental relocation of the items in a picture to a template was not a simple task as it demands a lot of concentration and attending to details such as the location of items according to each other. Providing the students with the playground design manipulated the resource-directing variable (spatial reasoning). The presence of the paragraph format and guidelines manipulated the resource-dispersing variable (task structure) (Masrom, Alwi & Daud, 2015). This manipulation would direct the participants' attention to their linguistic resources rather than to the mental reconstruction of the image of a playground. For the medium-complexity task, students were asked to describe one of three similar pictures of a park. However, no paragraph format and guidelines were provided to increase the complexity along a resource-dispersing dimension. Such a manipulation of variables intended to make students attend to the mental processes of positioning the objects in their place (spatial reasoning). For the high-complexity task, the participants were asked to provide carefully arranged details and vivid description of their favorite natural spot. Neither pictures nor paragraph format and guidelines were provided with this task. The challenge in this task was to make the students focus on transforming their mental image of a natural view on paper. The objective of the high-complexity task was to make students enrich their written production with details instead of counting things that they see as they usually tend to do in their writings. To ensure the efficacy of the treatment tasks, during the pilot study, the instructors were interviewed about their perceptions of the created tasks.The interview questions focused on teachers' perception of the task design: exploring whether the task materials reflect their objectives, whether the teachers can tell what lexical and grammatical structures are targeted, whether the tasks were of different complexity levels and what suggestions they can provide to improve the tasks. The interview questions are provided in Appendix B. Based on the teachers' feedback, similar pictures among the tasks were created instead of different pictures of natural scenes to serve as a baseline for comparing the results and an opportunity to use the target structures several times. The tasks were also modified in terms of their instructions to create more interesting scenarios to give the students' an incentive to get into the task since this particular population of students tends to perform tasks carelessly because the teacher asks them to do so. The final versions of the tasks are provided in Appendix C.

Task perception questionnaire: Following Robinson (2007), Thompson (2014) and Frear (2013), a task perception questionnaire was adapted to suit the purpose of the present study. The questionnaire is available in Appendix D. Its main objective was to enrich the data analysis with insights from the participants' point of view regarding complexity level of each treatment task. The participants completed a 21-item questionnaire on a 6 point scale (1=strongly disagree, 2= disagree, 3= slightly disagree, 4=slightly agree, 5=agree, 6=strongly agree) after each treatment task.The questionnaire contained three statements for each of seven categories. The categories of the questionnaire were as the following: difficulty of the tasks, attitude towards the tasks, fatigue factor during the task, sequencing of the tasks, time taken to accomplish the tasks, usefulness of the materials and clarity of the instructions. Means and standard deviations were obtained for learners' perception of complexity for each task (see Table 11). The participants agreed that the simple task was simple with a mean rate of 5.59 (SD=.59) in simple-to-complex sequence and a mean rate of 5.48 (SD=.75) in complex-to-simple sequence. After each group had accomplished the complex task, participants in simple-to-complex group disagreed that the complex task was simple with a mean rate of 2.19 (SD=.68). The participants in complex-to-simple sequence also disagreed that the complex task was simple with a mean score of 1.81 (SD=.40). Given these results, it was concluded that the operationalization of task complexity was matched with the participants' perception.

Table 11

Descriptive statistics of task perception questionnaire

	Simple task	Medium task	Complex task
	Mean (SD)	Mean (SD)	Mean (SD)
Simple-to-complex group	5.57 (.59)	4.95 (.59)	2.19 (.68)
Complex-to-simple group	5.48 (.75)	4.00 (.44)	1.81 (.40)

Procedure

The study took place over 4 weeks with participants carrying out research tasks two days per week. On October 3, the students were given a consent form to complete. Then, the students had 50 minutes (20 minutes for 3questions and 30 minutes for paragraph writing) to do the pre-test during which no questions were allowed. On October 5, the teacher explicitly explained the target structures as they were introduced in the students' textbook and the students practiced the new structures in groups. The treatment tasks were carried out on three sessions, Oct 7th, 10th, and 14th. Each treatment task was followed by answering the questionnaire. The increasing task complexity group performed tasks sequenced from low- to high-complexity writing tasks and the other group performed a sequence of high- to low-complexity tasks. On October 17, immediate post-test were administered. Two weeks later, on November 1, a delayed post-test took place.

Based on the pilot study, a decision of not allowing any questions during the tasks was made to encourage students to use their mental and already-available resources. Forty-five minutes turned out to be a sufficient amount of time to do the tasks. Table 12 represents the procedure of the study.

Table 12

Study procedure

	Pre-treatment			Treatment		Post-treatment	
Sequence group	Oct 3	Oct 5	Oct7	Oct10	Oct14	Oct17	Nov1
Simple-to-complex	Pre-test	explanation	Low	Medium	High	Immediate post-test	delayed post-test
Complex-to-simple			High	Medium	Low		

Data analysis

Students' written paragraphs and tests were collected. Hand-written paragraphs were converted into electronic Word files. Following Levkina and Gilabert's (2014) scoring method, the grammar and vocabulary tests were scored by assigning one point for each correct use of the target structure; half a point was assigned if the word was spelled incorrectly, and zero was assigned for the completely wrong use of vocabulary and spatial expressions. The paragraphs were coded for syntactic complexity, accuracy of the use of target structures, and written fluency. Syntactic complexity was measured in terms of the total number of relative subordinate clauses per words. Accuracy was measured in terms of the percentage of correct relative clauses per total number of relative clauses used (Thompson, 2014). To account for correctness, three criteria were set to consider the relative clause correct: correct choice of relative pronoun, the correct word order of the relative clause, and correct relative clause within its independent clause. If one of the criteria was not satisfied, the relative clause was considered incorrect, and thus it got zero as a score. In order to account for differences in text length, a proportion score for accuracy was calculated by dividing the number of correct relative clauses by the total number of attempted relative clauses. In terms of the use of the target vocabulary, one point was given for each correct use of target theme-related vocabulary, and one point for correct use of spatial expression and half a point was deducted for misspellings; zero was assigned for the wrong use of the lexical expression. Moreover, repeated target structures in written paragraphs were ignored to account for the overuse of target structures. That is, each lexical and spatial expression was counted only once. Written fluency was measured in terms of the total number of words written in each paragraph per 30 minutes (Johnson, Mercado & Acevedo, 2012). Interrater reliability for the use of target forms on tests and fluency, accuracy, and complexity measures were calculated for a subset of the checked target forms (25%), fluency (25%), accuracy (25%), and fluency (25%) which were then analyzed by an independent coder. Interrater reliability was obtained using Pearson correlations (r): Use of target forms $r = .98$; for fluency $r = .99$; for accuracy $r = .98$; and for complexity $r = .98$. To address the research question, a series of mixed ANOVAs with time as the within groups factor and task sequencing as the between-groups factor were carried out, with one test performed for each variable. An adjusted alpha rate of .006 for tests and alpha rate of .008 for treatment tasks were used to account for the use of multiple statistical tests.

Results

Task Sequencing and Target Lexical and Grammatical Forms

The first component of the research question asked whether the SSARC model of task sequencing encouraged L2 French students to use new lexical and grammatical forms in writing. Table 13 shows the mean scores and standard deviations of target lexical and grammatical forms.

Table 13

Descriptive statistics of lexical and grammatical forms

	Pre-test		Immediate post-test		Delayed post-test	
	Simple-to-complex	Complex-to- simple	Simple –to-complex	Complex-to - simple	Simple-to-complex	Complex-to-simple
Vocabulary test(out of 20)	3.76 (1.48)	4.04 (1.56)	16.42 (.97)	13.95 (1.43)	15.38 (2.10)	12.14 (1.85)
Written vocabulary use	.95 (.80)	.80 (.43)	6.90 (2.82)	3.66 (1.35)	3.85 (1.10)	1.95 (.66)
Spatial expression test (out of 20)	6.23 (1.30)	6.28 (1.58)	18.90 (.88)	16.14 (1.19)	17.95 (1.20)	12.95 (2.31)
Written spatial expression use	1.09 (.76)	1.19 (.87)	5.38 (1.90)	2.04 (1.50)	2.20 (.92)	1.04 (.74)
Relative pronoun test (out of 20)	1.76 (.70)	1.61 (.74)	16.71 (.90)	14.66 (1.55)	15.61 (1.07)	11.61 (1.35)
Written relative clauses	.43 (.50)	.38 (.49)	2.05 (.74)	1.38 (.59)	.81 (.40)	1.00 (.00)

Vocabulary

As shown in Table 13, the simple-to-complex group scored higher on the vocabulary test and used more vocabulary in writing compared to the other group. The results of the ANOVA for the vocabulary test showed a significant main effect for time [$F(2, 80)= 771.41$, $p=.001$, partial $\eta^2=.95$] and group [$F(1,40)=28.27$, $p=.001$, partial $\eta^2=.41$] and a significant interaction between time and group [$F(2, 80)=17.55$, $p=.001$, partial $\eta^2=.30$]. To explore the interaction effect, the vocabulary scores at each point in time from the two task sequencing groups were compared (with a Bonferroni correction). The results showed that there was no significant difference between the groups at the pre-test ($p = .54$, $d = 0.18$). However, the simple-to-complex group had significantly higher vocabulary scores than the complex-to- simple group on the immediate post-test ($p = .001$, $d = 2.02$) and the delayed post-test ($p = .001$, $d = 1.63$). Within simple-to-complex group, there was a significant effect for time [$F(1, 20) = 667$, $p= .001$, partial $\eta^2 = .97$]. The post-hoc comparisons showed that there was significant difference in the vocabulary score from pre-test to immediate post-test ($p = .001$, $d = 10.1$), from immediate post-test to delayed post-test ($p = .001$, $d = .63$), and from pre-test to delayed post-test ($p = .001$, $d = 6.39$). Within complex-to-simple group there was a significant effect for time [$F(1, 20) = 29.53$, $p= .001$, partial $\eta^2 = .59$]. The post-hoc comparisons showed that there was a significant difference in the vocabulary score from pre-test to immediate post-test ($p = .001$, $d = 6.6$), from immediate post-test to delayed post-test ($p = .001$, $d = 1.09$), and from pre-test to delayed post-test ($p = .001$, $d = 4.7$). For the written vocabulary use score, the mixed ANOVA results showed a similar pattern. Because the homogeneity of variance assumption was violated, the results are reported with the Greenhouse-Geisser correction. Between groups, there was a significant main effect for time [$F(1.39, 55.70) = 99.77$, $p = .001$, partial $\eta^2= .71$] and group [$F(1, 40) = 42.30$, $p = .001$, partial $\eta^2= .51$], and a significant interaction between time and group [$F(1.39, 55.70) = 12.37$, $p = .001$, partial $\eta^2= .24$].The post-hoc comparisons showed that there was no significant difference between the groups at the pre-test ($p = .570$, $d = 0.18$). However, the simple-to-complex group scored significantly higher than the complex-to-simple group on the immediate post-test (p = .001, d = 2.02) and the delayed post-test (p = .001, d = 1.63). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 89.01, p= .001, partial η^2 = .81]. The post-hoc comparisons showed that there was significant difference in the use of written vocabulary from pre-test to immediate post-test (p = .001, d = 2.8), from immediate post-test to delayed post-test (p = .001, d = 1.42), and from pre-test to delayed post-test (p = .001, d = 3.1). Within complex-to-simple group there was a significant effect for time [F (1, 20) = 29.53, p= .001, partial η^2 = .59]. The post-hoc comparisons showed that there was a significant difference in the use of written vocabulary from pre-test to immediate post-test (p = .001, d = 2.5), from immediate post-test to delayed post-test (p = .001, d = 1.6), and from pre-test to delayed post-test (p = .001, d = 1.5). To summarize the findings for vocabulary, the simple-to-complex group scored significantly higher than the complex-to-simple group on both post-tests for both the discrete-point vocabulary test and their use of the target vocabulary in writing.

Spatial Expressions

The same pattern was found for the spatial expressions. The simple-to-complex group scored higher on the spatial expression test and used more spatial expressions on both post-tests compared to the complex-to-simple group. The mixed ANOVA with the Greenhouse-Geisser correction showed a significant main effect for time [F (1.63, 65.22) = 52.04, p =.001, partial η^2=.56] and group [F (1,40) = 51.35, p =.001, partial η^2 =.56] and a significant interaction between time and group [F (1.63, 65.22) = 20.95, p =.001, partial η^2=.34]. To explore the interaction effect between time and group, the spatial expressions scores from the two task sequencing groups were compared for each test using a Bonferroni correction. The results showed that there was no significant difference between the groups at the pre-test (p = .70, d =

1.44). However, the simple-to-complex group scored significantly higher than the complex-to-simple group on the immediate post-test ($p = .001$, $d = 0.5$) and the delayed post-test ($p = .001$, $d = 1.44$). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 820.01, $p = .001$, partial $\eta^2 = .97$]. The post-hoc comparisons showed that there was significant difference in the spatial expression score from pre-test to immediate post-test ($p = .001$, $d = 11.3$), from immediate post-test to delayed post-test ($p = .001$, $d = .90$), and from pre-test to delayed post-test ($p = .001$, $d = 9.36$). Within complex-to-simple group there was a significant effect for time [F (1, 20) = 113.3, $p = .001$, partial $\eta^2 = .85$]. The post-hoc comparisons showed that there was a significant difference in the spatial expression scores from pre-test to immediate post-test ($p = .001$, $d = 7.04$), from immediate post-test to delayed post-test ($p = .001$, $d = .34$), and from pre-test to delayed post-test ($p = .001$, $d = 3.37$). The same pattern was found for the use of spatial expressions in writing. The mixed ANOVA with the Greenhouse-Geisser correction showed a significant main effect for time [F (1.73, 69.56) = 698.68, $p = .001$, partial $\eta^2 = .94$] and group [$F(1,40) = 90.96$, $p = .001$, partial $\eta^2 = .69$] and a significant interaction effect between time and group [$F(1.73, 69.56) = 31.09$, $p = .001$, partial $\eta^2 = .43$]. The post-hoc results showed that there was no significant difference between the groups at the pre-test ($p = .91$, $d = .12$). However, the simple-to-complex group scored significantly higher than the complex-to-simple group on the immediate post-test ($p = .001$, $d = 1.95$) and the delayed post-test ($p = .001$, $d = 1.18$). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 11.50, $p = .003$, partial $\eta^2 = .36$]. The post-hoc comparisons showed that there was significant difference in the use of written vocabulary from pre-test to immediate post-test ($p = .001$, $d = 2.96$), from immediate post-test to delayed post-test ($p = .001$, $d = 2.13$), and from pre-test to delayed post-test ($p = .001$, $d = 1.30$). Within complex-to-simple group there was no significant effect for time [F (1, 20) = .68, p = .41, partial η^2 = .03]. Thus, the findings for spatial expressions, as measured by both test scores and use in writing, indicated that the simple-to-complex group scored significantly higher on both post-tests. Complex-to-simple group did not show any improvement in the use of written spatial expressions from pre-test to immediate post-test and delayed post-test.

Relative Pronouns

Both groups showed a similar pattern for the relative pronoun scores obtained on tests and written relative clauses. Both groups scored the most on the immediate post-test with a slight decline of scores on delayed post-tests. The mixed ANOVA results showed a significant main effect for time [F (2, 80) = 2601.43, p =.001 , partial η^2 =.98] and group [F (1,40) = 74.64, p =.001, partial η^2=.65] and a significant interaction between time and group [F (2, 80) = 42.36, p =.001, partial η^2 =.51]. The post-hoc tests indicated that there was no significant difference between the groups at the pre-test (p = .52, d =.20). However, the simple-to-complex group scored significantly higher than the complex to simple group on the immediate post-test (p = .001, d = 1.61) and the delayed post-test (p = .001, d = 3.28). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 2263.61, p = .001, partial η^2 = .99]. The post-hoc comparisons showed that there was significant difference in the relative pronoun scores from pre-test to immediate post-test (p = .001, d = 18.5), from immediate post-test to delayed post-test (p = .001, d = 1.11), and from pre-test to delayed post-test (p = .001, d = 15.3). Within complex-to-simple group there was a significant effect for time [F (1, 20) = 815.83, p = .001, partial η^2 = .97]. The post-hoc comparisons showed that there was a significant difference in the relative pronoun scores from pre-test to immediate post-test (p = .001, d = 10.74), from immediate post-test to delayed post-test (p = .001, d = 2.09), and from pre-test to delayed post-test (p = .001, d =

9.18). In terms of the students' use of relative clauses in writing, there were a significant main effect for time [$F(2, 80) = 85.27$, $p=.001$, partial $\eta^2 =.68$] and a significant interaction effect between time and group [$F\ (2, 80) = 9.55$, $p =.10$, partial $\eta^2 =.06$]. However, there was no significant effect for group [$F\ (1,40) = 2.73$, $p =.001$, partial $\eta^2 =.65$]. The post-hoc test results showed that there was no significant difference between the groups at the pre-test ($p = .76$, $d = .10$) or the delayed post-test ($p = .03$, $d = .67$). However, the simple-to-complex group scored significantly higher than the complex-to-simple group on the immediate post-test ($p= .002$, $d = 1.00$). Within simple-to-complex group, there was a significant effect for time [$F\ (1, 20) = 56.93$, $p= .001$, partial $\eta^2 = .74$]. The post-hoc comparisons showed that there was significant difference in the use of written relative pronouns from pre-test to immediate post-test ($p = .001$, $d = 2.5$) and from pre-test to delayed post-test ($p = .001$, $d = 0.83$). There was no difference in the use of written relative pronouns from immediate post-test to delayed post-test ($p = .023$, $d = 2.08$). Within complex-to-simple group there was significant effect for time [$F\ (1, 20) = 32.24$, $p = .001$, partial $\eta^2 = .61$]. The post-hoc comparisons showed that there was significant difference in the use of written relative pronouns from pre-test to immediate post-test ($p = .001$, $d = 1.84$) and from pre-test to delayed post-test ($p = .001$, $d = 0.91$). There was no difference in the use of written relative pronouns from immediate post-test to delayed post-test ($p = .023$, $d = 1.78$). In sum, the simple-to-complex group scored significantly higher on the relative clause for the immediate and delayed post-tests and used more relative clauses when writing on the immediate post-test only.

To summarize, the findings for the target forms, test scores, and written target forms were low at the pre-test. The simple-to-complex group had higher scores on all measures on both post-tests. Although their scores decreased slightly on the delayed post-test, the delayed post-test scores for simple-to-complex group remained higher than their pre-test scores.

Task Sequencing and Fluency, Accuracy, and Complexity

The second component of the research question asked whether the SSARC model of task sequencing would elicit more accurate, fluent, and complex written production. Table 13 shows the descriptive statistics for the fluency, accuracy, and complexity scores by group and time.

Table 14

Descriptive statistics of fluency, accuracy, and complexity measures

Measures	Pre-test		Immediate post-test		Delayed post-test	
	Simple-to-complex	Complex-to- simple	Simple-to-complex	Complex-to- simple	Simple-to-complex	Complex-to- simple
Fluency	59.57 (14.08)	62.47 (11.38)	155.04 (30.28)	116.57 (19.85)	93.95 (14.05)	78.57 (9.98)
Accuracy	.00% (.00)	.00% (.00)	95.63% (9.72)	77.69% (23.15)	76.03% (21.89)	51.50% (38.26)
Complexity	.00 (.00)	.01 (.01)	.02 (.01)	.02 (.01)	.02 (.01)	.03 (.01)

Fluency

Fluency was measured in terms of a total number of written words per 30 minutes. The simple-to-complex group produced more fluent language on immediate post-test and delayed post-test compared to complex-to-simple group (see Table 14). The mixed ANOVA with the Greenhouse-Geisser correction showed a significant main effect for time [F (1.40, 56.06) = 187.91, p =.001, partial η^2 =.82] and group [F (1, 40) = 28.27, p=.001, partial η^2=.41] and a significant interaction between time and group [F (1.40, 56.06) =13.95, p=.001, partial η^2 =.25].

To explore the interaction effect, the fluency scores from the two task sequencing groups were compared for each test using a Bonferroni correction. The results showed that there was no significant difference between the groups at the pre-test (p = .46, d = 3.07). However, the simple-to-complex group was significantly more fluent than the complex-to-simple group on the immediate post-test (p = .001, d = 1.86) and the delayed post-test (p = .001, d = 2.00). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 107.81, p= .001, partial η^2 = .84]. The post-hoc comparisons showed that there was significant increase in fluency from pre-test to immediate post-test (p = .001, d = 4.04) and from pre-test to delayed post-test (p = .001, d = 2.44) and there was a significant difference in fluency scores between immediate post-test and delayed post-test (p = .001, d = 2.58). Within complex-to-simple group there was also a significant effect for time [F (1, 20) = 84.58, p = .001, partial η^2 = .80]. The post-hoc comparisons showed that there was a significant difference in the fluency cores from pre-test to immediate post-test (p = .001, d = 3.34), from immediate post-test to delayed post-test (p = .001, d = 2.41), and from pre-test to delayed post-test (p = .001, d = 1.50).

Accuracy

A similar pattern was found for the accuracy scores. Accuracy was measured in terms of the percentage of correct relative clauses produced per total number of attempted relative clauses. The simple-to-complex group produced more accurate relative clauses on both post-tests compared to the complex-to-simple group. The mixed ANOVA with the Greenhouse-Geisser correction showed a significant main effect for time [F (1.36, 54.44) = 193.29, p =.001, partial η^2=.82] and group [F (1,40)=28.27, p=.001, partial η^2=.41] and a significant interaction between time and group [F (1, 40) = 15.36, p =.001, partial η^2=.27]. To explore the interaction effect, the accuracy scores from the two task sequencing groups were compared for each test using a

Bonferroni correction. The post-hoc tests showed that the simple-to-complex group was significantly more accurate than the complex-to-simple group on the immediate post-test (p = .002, d = 2.7). However, there was no significant interaction effect of accuracy on the delayed post-test (p = .015, d = 0.83). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 267.76, p = .001, partial η^2 = .93]. The post-hoc comparisons showed that there was significant difference in the accuracy score from pre-test to immediate post-test (p = .001, d = 13.9), from immediate post-test to delayed post-test (p = .006, d = .89), and from pre-test to delayed post-test (p = .001, d = 4.9). Within complex-to-simple group there was a significant effect for time [F (1, 20) = 48.51, p = .001, partial η^2 = .70]. The post-hoc comparisons showed that there was a significant difference in the accuracy scores from pre-test to immediate post-test (p = .001, d = 4.7) and from pre-test to delayed post-test (p = .001, d = 1.90). There was no significant difference in accuracy scores between immediate post-test and delayed post-test (p = .04, d = .82).

Complexity

Complexity was measured in terms of total number of relative clauses used per total number of written words. Complexity scores of both groups were identical. The results of the mixed ANOVA test showed a significant main effect of time on complexity [F (2, 80) = 27.45, p =.001, partial η^2 =.40]. However, there was no significant effect of group [F (1, 40) = .16, p =.69, partial η^2 =.004] and no significant interaction effect between time and group [F (2, 80) =1.23, p=.29, partial η^2=.03]. In other words, there were increases in complexity over time, but no between-group differences. Post-hoc tests showed that the scores increased from pre-test to immediate post-test (p = .001 , d= 1.29) and from pretest to delayed post-test (p = .001 , d = 1.34). Within simple-to-complex group, there was a significant effect for time [F (1, 20) = 18.26,

$p = .001$, partial $\eta^2 = .47$]. The post-hoc comparisons showed that there was significant difference in the complexity score from pre-test to immediate post-test ($p = .003$, $d = 2.82$) and from pre-test to delayed post-test ($p = .004$, $d = 2.82$). There was no difference in complexity scores on immediate post-test and delayed post-test ($p = 1.00$, $d = 0.1$). Within complex-to-simple group, there was significant effect for time [$F(1, 20) = 11.04$, $p = .001$, partial $\eta^2 = .35$]. The post-hoc comparisons showed that there was no significant increase in the complexity scores from pre-test to immediate post-test ($p = .01$, $d = 2.9$) and no significant increase in complexity scores from immediate post-test to delayed post-test ($p = .24$, $d = 0.5$). However, there was significant increase in complexity scores from pre-test to delayed post-test ($p = .001$, $d = 2.4$).

To summarize the findings, the written texts produced by the simple-to-complex group were significantly more fluent and accurate than those written by the complex-to-simple group for both post-tests. However, there were no group differences in complexity measure.

Discussion

The current study examined the effect of the SAARC model of task sequencing on the French L2 students' knowledge and use of theme-related vocabulary, spatial expressions, and relative clauses, as well as their written complexity, accuracy, and fluency.

Target Forms

Regarding the first component of the research question, the results showed that although the simple-to-complex group scored higher on the post-tests and used more target forms in writing than the complex-to-simple group, both groups used and learned the target forms. The results have shown that sequencing pedagogical tasks based on creating several versions of the same task with different cognitive demands may encourage the learners to use the newly learned forms in their written production. More specifically, the present study supported the idea that sequencing tasks from cognitively simple to cognitively more complex tasks allows for cumulative learning (Robinson, 2010). The learners that performed tasks in an increasing order of complexity scored higher than the learners in the other group on both post-tests. This finding suggests that the simple-to-complex task may play a positive role in retaining information for a longer time. It seems that the learners learn better the target forms when they are encouraged to use them in their written productions. The simple-to-complex group performed the simple task first which encouraged them to rehearse the target forms. On the subsequent versions of the tasks, they had an opportunity to recall these target forms and practise them one more time. It is noteworthy that this population of students usually writes only two paragraphs for each theme in their textbooks: they write one paragraph as an assignment and one paragraph on the test before moving to the next theme or lesson. This suggests that performing several written tasks of different levels of complexity and that elicit the use of the target forms helped both groups in the present study to learn the target forms. However, performing a series of tasks that subsequently increases their cognitive demands can explain why the simple-to-complex group outperformed the other group. Results in the present study are in line with studies that reported that the SSARC model of task sequencing elicited increased use of target forms (Thompson, 2014) and induced higher retention of input (Levkina & Gilabert, 2014).

Fluency, Accuracy, and Complexity

The second component of the research question dealt with written production. The question was whether the SSARC model of task sequencing would lead to more fluent, accurate, and complex language. The results indicated that both groups produced increasingly fluent and accurate language over time. However, the simple-to-complex group produced more fluent and accurate language with higher scores on the immediate post-test.

With regard to fluency, the findings here revealed that students, in both groups, produced more fluent language on both post-tests. This increase in fluency from pre-test to post-tests can be explained in terms of treatment tasks that served as the extra-curriculum practice of the lesson explained before the treatment tasks. Although the fluency did not increase from one treatment task to another between the groups, the students' writings became more fluent after the treatment tasks. The teacher explicitly taught the theme-related vocabulary, explained the function of spatial expressions in paragraph writing through analyzing a model text and taught them French simple relative pronouns with one practice activity as she used to do in her classes. During treatment tasks, students in both groups produced three extra paragraphs in which they had to use the target forms to complete their written tasks. As a result, when they encountered similar scenarios, describing different natural views, during the post-tests, they were prepared with ideas and with linguistic resources; consequently, they wrote more on the post-tests compared to pre-test writing. The present findings suggest that task sequencing have no effect on written fluency. However, writing paragraphs several times may have led to increases in fluency scores on post-tests. This finding is consistent with Malicka's (2014) finding that task sequencing has no effect on fluency. However, Malicka investigated the effect of the SSARC model on oral language production. Written and oral modes are not the same and each of them requires different processing requirements (Frear, 2013). The only study that reported that increasing task complexity increases the fluency of a written language production was that of Ishikawa (2007). However, Ishikawa explored the effect of task complexity, that is, simple task versus complex task, on language production.

With regard to written accuracy, the finding of the present study partially confirms Malicka's (2014) finding that performing complex tasks led to the production of more accurate speech. Performing complex tasks make learners stretch their linguistic resources to reconstruct links between forms and functions resulting in more accurate language (Malicka, 2014). Since both groups in the present study performed complex versions of tasks in their sequences, they had an opportunity to "stretch" their linguistic resources to meet the demands of the tasks resulting in more accurate language on post-tests compared to the accuracy results on the pre-test. However, treatment tasks did not show any effect of different task levels on accuracy. Lambert and Robinson's (2014) study revealed that there was no significant difference in the accuracy of learners' performance between the simple-to-complex group and the control group. The reason for this difference may refer to Lambert and Robinson's operationalization of so many task complexity dimensions at a time. They manipulated their task complexity along a number of elements and +/-reasoning demands for the resource-directing dimension and along +/-planning time, +/-prior knowledge, +/-number of steps, and +/-multi-tasking dimensions for resource-dispersing variables.

With respect to complexity, the results of the present study showed gains in complexity over time but no group difference. The complexity measure adopted in this study may be the reason for the null findings between the groups. To illustrate, complexity was measured in terms of relative clauses produced per a total number of written words, the measure of fluency. Both groups proved to be at the same level as shown by the results of the pre-test. Both groups used more relative clauses after treatment and produced more fluent paragraphs. As a result, both groups produced more complex language. In fact, this not only explains why there was an increase in complexity over time, but also suggests that, in this particular study, increased use of target forms leads to increase in complexity. Overall, the complexity findings are in line with studies that found that manipulating task complexity along +/-reasoning demands leads to more complex written production (Niwa, 2000; Salimi, Dadaspour & Asadollahfam, 2011). In addition, this finding of structural complexity is consistent with Malicka's (2014) study that showed that the order of sequencing tasks was irrelevant on the complexity measure. Nevertheless, Lambert and Gilabert's (2014) study reported no gains in complexity between the SSARC group and the control group. The difference in finding might be related to the number of manipulated variables along the resource-directing and resource-dispersing dimensions. All in all, these studies confirm the predictions of the SSARC model that increasing cognitive demands of the task through manipulating resource-directing and resource-dispersing dimensions of a task induce improved linguistic performance on fluency, accuracy, and/or complexity during task-based work.

Pedagogical implications

The current study provides several pedagogical implications for teaching. First, the results suggested that pedagogical tasks should be sequenced along resource-directing combined with resource-dispersing, dimensions of task complexity as outlined by the SSARC model of task sequencing. Resource-dispersing variables such as planning time, task structure, number of involved steps to accomplish the task, and prior knowledge, when incorporated into task design, impose procedural demands on cognition to perform the task without paying attention to creating particular form-meaning mappings (Robinson, 2011). Resource-directing variables, such as spatial reasoning, causal reasoning, intentional reasoning, here and now, and perspective taking, engage learners in conceptual and cognitive demands that they try to perform through noticing and creating a semantic mapping between the form and the meaning to produce comprehensible language. What teachers and task designers should know is that each of these task complexity dimensions plays an integral role in facilitating language learning. Thus, teachers should consider creating task-based lesson plans that gradually incorporate different task complexity variables throughout different stages of the lesson to promote better quality learning with sustained gains.

Second, it seems that performing simple tasks provides the learners with an opportunity to rehearse the target forms and retain them longer. Learners in the simple-to-complex group performed better on post-tests and used more target forms in writing than the other group (Levkina & Gilabert, 2014; Lambert & Robinson, 2014; Robinson, 2010; Thompson, 2014). Starting with simple tasks can be beneficial for the learners.. Learners' regular textbook focused on vocabulary (theme-related vocabulary), grammar (relative pronouns) and writing (descriptive paragraph). To integrate these items in the study, spatial reasoning (resource-directing) and task structure (resource-dispersing) variables were chosen first because they were deemed appropriate to elicit the target forms and second because these specific variables were not investigated in previous studies on task sequencing in the written mode. Thus, after the teacher had explained the lesson as she usually did, the learners received pictures that contained theme-related vocabulary with their locations (to elicit spatial expressions), and they got instructions on how to structure their paragraphs (paragraph format and guidelines). During the medium complexity task, they were asked to write a paragraph describing a similar picture to the first one, but this time with no instructions to structure the task. On the complex task, the learners were asked to write a paragraph in which they provided a detailed description of a playground design. In this way, the learners rehearsed and practiced the target forms on several occasions and implemented them in their writings. Learners' ratings on the questionnaire confirmed that they perceived the differences in task complexity as it was intended to be (refer to Table 11). This brings us to the next implication.

Third, the SSARC model has shown to be a practical and applicable model rather than just a theoretical framework (Lambert & Robinson, 2014). With some training, teachers would be able to rely on the SSARC model to plan their task-based lessons with different levels of complexity to suit all proficiency levels. Indeed, following the steps proposed by the SSARC model of task sequencing, it was not difficult to design three tasks of different complexity levels.

Fourth, the SSARC model encourages repetition each time focusing on a different aspect of the task, which is really important for the classroom setting, especially where students do not have enough language practice. As was mentioned earlier, the learners in the present study does not have many opportunities to produce many written paragraphs for each unit as the teacher has to follow the curriculum, as is the case in many schools around the world. Thus, introducing task-based lessons that involve sequencing the lesson and the practice component would be beneficial. Moreover, much language learning takes place when learners attend to meaning rather than to form (Prabhu, 1987). A good way to make learners attend to meaning is by asking them to produce their paragraphs starting with provisioned input and ending with an individual written text without further support. This is exactly what happens when learners perform a series of tasks sequenced from less complex to more complex. This, in turn, leads to repeating the content of the task, but each time manipulating a different aspect of the task depending on the intended objectives of the lesson.

Limitations and Future Directions

The current study has many limitations that should be acknowledged. First, the sample size was small ($n=42$). A larger sample size would be favored for future research. There is only one study that investigated the effect of the SSARC model of task sequencing along resource-directing and resource-dispersing dimensions of task complexity. Thus, there is a limited number of studies whose findings could be compared to the current study, which means that these findings should be interpreted with caution. For the present moment, the results of the SSARC model are still promising in the field of task sequencing and serve as a grounded theoretical and empirical basis for further research in this domain. More studies are needed to test the claims of the SSARC model of task sequencing on the use of new target forms and language production. Another limitation was the absence of a control group. A control group would provide insight into whether language practice through written tasks, regardless of their complexity level, might be sufficient to facilitate students' use of the target structures and increase complexity, accuracy, and fluency. Future research might include a control group while experimenting with the effect of different sequence orders. The explanation of the results was speculative in nature and guided by the theoretical claims of the SSARC models. The current study did not implement any technique to tap into the mental processes that took place during task performance. Thus, future research may implement think aloud protocols or stimulated recalls to draw on the mental performance of the task (Levkina & Gilabert, 2014). Finally, students did not receive any feedback. Thus they did not know how they performed on each task. They did not get their tests back to see how they performed and to learn from their mistakes. Thus, future research may also investigate the combined effect of the SSARC model of task sequencing with feedback on language production. It might be the case that providing students plus feedback after each treatment task would facilitate the learning process and lead to better retention and longer sustained learning gains.

Conclusion

To conclude, the present study provided additional insight into our understanding of the SSARC model of task sequencing. Although both sequences promote language learning, sequencing tasks from simple-to-complex resulted in significantly higher usage of target forms than ordering tasks from complex-to-simple. The present study also suggested that both groups produced more fluent, accurate and more complex language over time. However, although the simple-to-complex sequence produced more fluent and accurate language, it did not lead to greater complexity compared to complex-to-simple sequence. These findings confirm the predictions of the SSARC model of task sequencing and show that the SSARC model is a useful approach for sequencing tasks and task-based lesson planning.

Chapter3

Results from the present study showed that sequencing from simple to more complex tasks encourages learners to use more target forms and to produce more fluent and accurate language. This finding suggests that Robinson's SSARC model can fill the first gap in the literature concerning the absence of a theoretically-driven and empirically-tested approach for sequencing tasks. It also suggests that tasks should be sequenced along resource-directing and resource-dispersing dimensions for each dimension plays a different role in language learning. Resource dispersing variables, for example, direct learners' attentional resources to focus on task performance without guiding any specific attention to particular form-meaning mappings (Robinson, 2011). Resource-directing variables, however, require learners to pay attention to linguistic resources, analyze them in terms of how they fit within the task, thus producing a comprehensible language after noticing and creating a semantic mapping between the form and the meaning.

This study might be added to the studies that showed through their task design that task complexity may be considered a reliable construct in designing written tasks that promote language learning (Ishikawa, 2007; Kuiken &Vedder, 2007, 2008, 2012; Niwa, 2000; Ong & Zhang, 2010; Salimi, Dadaspour &Asadollahfam, 2011). This study also confirmed that task complexity can be used to sequence pedagogical tasks that can lead to better language learning (Lambert & Robinson, 2014; Levkina & Gilabert, 2014; Malicka, 2014; Thompson, 2014). First, research has shown that tasks are the most effective means to engage the complex learning processes during language use (Baralt, Harmath-de Lemos &Werfelli, 2014; Ekuni, Vaz & Bueno, 2011). Second, tasks that are based on cognitive complexity engage the learners in deep processing of target forms. The deeper the processing of information is, the more durable and sustainable learning will result (Ahmadi & Nazari, 2014).

Concerning the second problem related to defining task complexity as a construct, research has shown that Robinson's task complexity framework that is proposed in his Triadic Componential framework succeeded in addressing the challenge of defining 'simple' and 'complex' tasks. Robinson distinguished between cognitive complexity which is referred to as a resource-directing dimension of task complexity, and procedural complexity, which is referred to as a resource-dispersing dimension of task complexity. Manipulating these two continuums creates a series of tasks of different complexity levels. The simplest task (- resource-directing and - resource-dispersing) is defined as a 'simple' task. The most complex task that results from the manipulation of these dimensions is defined as a complex task. However, it should be pointed out that learners may not necessarily perceive task complexity as it is designed to be. Robinson addressed this point in his Triadic Componential Framework when he distinguished between task complexity and task difficulty. The present study adopted a task perception questionnaire to help analyze the results of the study in light of learners' perception of the tasks. Analyzing the task perception questionnaire showed that the participants perceived the tasks as they were designed to be. This observation may indicate that teachers should take into consideration learners' level to create a series of tasks that learners can accomplish successfully. The results of the questionnaire in the present study are consistent with the results of other studies that used task perception questionnaire (Levkina & Gilabert, 2014; Malicka, 2014; Thompson, 2014) ensuring that tasks are at the right level for learners.

To summarize, the present study emphasized Robinson's (2010, 2015) two principles of task sequencing that led to the creation of the SSARC model. The first principle of task sequencing states that only the cognitive demands of tasks are sequenced (Robinson, 2010, 2015). This claim was tested in many studies on task complexity and showed that task complexity is an effective approach to task sequencing. This brings us to the second principle that states that tasks should be sequenced according to the cognitive complexity the task imposes on the learners to ensure better language learning. This principle suggests that other sequences may be effective as well for language learning as many studies suggested (Baralt, 2014, Malicka, 2014; Robinson, 2011). However, there is an increasing body of research that advocates a simple-to-complex sequence. This principle states that cognitive complexity is increased on the resource-dispersing dimension first, and then it is increased on the resource-directing dimensions. Referring to the findings of the current study, it can be concluded that although the complex-to-simple sequence leads to language learning as was seen with other studies on task sequencing, it is recommended to sequence tasks from simple-to-complex to achieve better language learning results.

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Appendixes

Appendix A: Test sample

Partie 1 :

Votre ami a déménagé au Canada et vous a envoyé une photo d'une scène naturelle. Rédigez un paragraphe décrivant en détail cette photo afin que le lecteur puisse imaginer la scène.

Partie 2 : Vocabulaire

A.

Regardez la chambre à coucher et complétez les phrases avec les mots correspondants. Pour vous aider, chaque numéro dans la photo correspond à un mot dans l'image.

1-l'affiche, 2-le globe, 3-le lustre, 4-l'armoire, 5-le lit, 6-la lampe, 7- la table de nuit, 8-les pantoufles, 9- la guitare, 10- les chaises, 11-la table, 12- les jouets et étagères, 13-l'aquarium, 14-les rideaux, 15- le radio, 16-la caméra, 17-le perroquet, 18- la commode avec les tiroirs, 19-les fenêtres.

1- La table est ent… les deux chaises.
2- Le lit est en f…… … l'armoire.
3- Le perroquet est d.… la cage.
4- La commode a 4 tiroirs para……………..
5- Le globe est à cô…… ….. l'affiche.
6- Da…….. l'étagère, il y a des jouets.
7- Les chaises et la table sont au m………… … chambre.
8- Au c…… … la chambre, il y a une boule.
9- La commode est à dr…… …. l'armoire.
10- La fenêtre se trouve der…… …. rideaux.
11- La table est ent…… les chaises.
12- D……..….. mur, il y a une commode et une armoire.
13- Il y a une guitare dev…..…. le lit
14- Il y a un lustre au mi……… du plafond.
15- L'affiche et le globe se trouvent au f……… …… la chambre.
16- La lampe se trouve à ga……… ... lit.
17- Les pantoufles sont d………… le lit
18- L'aquarium se trouve au d………… .... l'étagère.
19- La boule est sou…… la table.
20- Les pantoufles sont s……… …. lit.

B.

Complétez les phrases suivantes.

Quand j'étais enfant, j'avais l'habitude de faire mon tri……. dans le quartier.

1- J'ai acheté des pla………… déc ……………et je les ai mises sur mon balcon. Il a l'air si vivant maintenant.
2- J'aime m'asseoir sur le ba……… dans le parc et lire des livres.
3- La personne qui roule en vélo est appelée une cyc…………………………..
4- Mes enfants adorent faire du tob…………
5- La zone où vous trouvez l'image des bicyclettes imprimé sur le terrain est appelée la pis…… cyc……………………..
6- Regarde! Les oiseaux boivent dans la fon……………..
7- J'aime la douceur du vent qui caresse mon visage lorsque je joue sur mon vieux bal…………………..
8- Dans La forêt près de notre maison, il y a des arb………… tou……..
9- Ce secteur est construit………… ..… les jeunes puissent jouer là-bas.

10- J'ai acheté une maison avec un jar…………….. plein de fleurs.
11- Nous ne pouvons pas traverser le terrain car il est protégé par une clô…………….. filaire.
12- J'aime regarder le ga…………… synthétique. Il ressemble au gazon naturelle.
13- Je me suis réveillé tôt ce matin, je me suis amusé à regarder le lev……… du sol………… .Il était très beau.
14- Je connais cet endroit dont vous parlez. On peut trouver des col…………….., des vallées et des montagnes.
15- Les meubles de la salle à manger sont constitués de boi…… naturelle.
16- Le nua……. de cendres noires a rendu difficile la circulation dans les rues.

Partie 3 : Grammaire

Remplir les espaces avec le mot approprié.

1- *Mon frère a pris l'argent…… était dans le tiroir.*
2- *J'ai soigneusement rangé la robe ……. j'ai achetée.*
3. *La ville ...... tu habites est très belle.*
4. *Au cinéma, j'ai vu un film ……. m'a beaucoup plu.*
5- *Son fils était malade…………….. hier soir.*
6- *J'ai versé à la banque l'argent ……. tu m'avais remis.*
7- *Nous avons passé les vacances dans le village .... je suis née.*
8- ………. j'ai visité le musée ducentre ville.
9- Paul a oublié le titre de …… film préféré.
10- *C'est un acteur…….. est fou.*
11- Je te présente M. Lafleur ……. je t'ai parlé hier, son fils est l'ami de Benjamin.
12- Mon père est parti à Nice; il passera le weekend end ………...
13- Elle porte un chapeau…….. tu ne devineras jamais la couleur.
14- Je fais du yoga …………. le jour.
15- J'ai écrit un article ……. jesuis fier.
16- *Le film …… j'ai vu était nul.*
17- *Elle est sortie au moment ……… j'entrais.*
18- *…………….. je travaille jusqu'à 15h.*
19- *Mira était très occupée la semaine passée ………. elle a profité du weekend pour dormir.*
20- *Vous devez prendre l'autobus, ……………….. un taxi vous coûtera une fortune.*

Appendix B: Entretien avec l'enseignant

1- Regardez les exercices et les images fournies avec. Est-ce qu'ils peuvent servir comme contenus supplémentaires pour une des structures linguistiques dans le module 5 du manuel ?
   a) Si oui, quelles structures linguistiques peuvent être pratiquées via ces exercices ? Expliquez.
   b) Sinon, pourquoi pensez-vous que ces exercices ne permettent pas d'atteindre les objectifs de cette leçon ?
   c) Avez-vous des suggestions pour améliorer le contenu afin qu'il puisse être utilisé pour pratiquer l'une des structures linguistiques ?
2- Pensez-vous que l'exercice est difficile ?
3- Pouvez-vous classer les exercices du plus simple au plus complexe ? expliquez votre choix.
4- Pensez-vous que les élèves seront capables de faire tous les exercices correctement ? Pourquoi ?
5- Chaque classe de niveau 8 aura une séquence d'exercices différents. Dans une première classe, les élèves auront des exercices à complexité croissante. Dans une deuxième classe, les élèves auront des exercices à complexité décroissante. Pensez-vous qu'il y aura une différence entre les productions écrites des deux classes ?
6- Avez-vous des questions, suggestions et/ou remarques ?

Appendix C: Treatment tasks

Low-complexity task

1. No spatial reasoning = presence of a picture

Votre municipalité a décidé d'organiser un concours de la meilleure conception d'une cour de récréation. La description la plus claire sera choisie. Imaginez que vous souhaitez proposer une cour de récréation qui ressemble à celle présentée dans l'image ci-dessous. Votre tâche consiste à décrire la cour d'une façon détaillée en utilisant les expressions dans la case ci-dessous et le modèle vide qui vous permettra de mieux organiser vos pensées.

2. +Task structure (paragraph format and guidelines are provided)

1. Format du paragraphe
    a. Phrase sujet
    b. Renseignements / détails et précisions (5 phrases au minimum)
    c. Phrase de conclusion
2. Instructions
    a. Regardez la figure et faites attention aux détails.
    b. Fournir des descriptions sensorielles : visuelle, sonore, tactile, olfactive, gustative
    c. Utilisez des métaphores et des personnifications
    d. Décrivez l'ambiance de la photo

Medium-complexity task

1- No spatial reasoning= presence of a picture
2- No task structure (no paragraph format and guidelines)

Décrivez la photo suivante. N'oubliez pas d'inclure le plus de détails possibles.

High-complexitytask

1. +Spatial reasoning (no picture)

2. No task structure

Votre groupe a défini le plan pour un terrain de jeux. Vous devez rédiger un paragraphe décrivant le plan afin que l'architecte qui lit ce paragraphe puisse être capable de dessiner le même plan.

Appendix D: Task perception questionnaire

Êtes-vous d'accord avec les phrases suivantes ? (1 = pas du tout d'accord et 6 = tout à fait d'accord)

Pas du tout d'accord	Pas d'accord	Assez pas d'accord	Assez d'accord	D'accord	Tout à fait d'accord
1	2	3	4	5	6

		1	2	3	4	5	6
1.	L'exercice était facile						
2.	L'exercice m'a permis d'utiliser mon imagination.						
3.	Je n'ai pas besoin de réfléchir profondément pour faire l'exercice.						
4.	Je comprends que ces exercices me permettront d'améliorer ma production écrite						
5.	Je me suis appliqué à faire l'exercice et j'ai utilisé au mieux mes capacités et mes connaissances.						
6.	J'ai essayé de faire de mon mieux durant cet exercice						
7.	Je pensais à autre chose tout en faisant la tâche						
8.	J'ai essayé de finir le plus rapidement possible.						
9.	J'étais fatigué pendant que je faisais l'exercice.						
10.	J'ai pu faire un lien entre cet exercice et le précédent.						
11.	J'ai eu l'impression que les exercices n'étaient pas liés						
12.	Je n'ai pas pu faire de lien entre cet exercice et le précédent						
13.	Le temps était suffisant pour finir l'exercice						
14.	J'ai passé beaucoup de temps à regarder la photo						
15.	J'auraisbesoin de plus de temps pour finir les futurs exercices						
16.	Je n'ai pas besoin de penser au vocabulaire et aux expressions nécessaires pour finir l'exercice.						
17.	J'ai passé plus de temps sur la description de la photo que sur la recherche du vocabulaire approprié.						
18.	En général, les images ont facilité la réalisation du travail demandé.						
19.	Les instructions étaient claires						
20.	Les exercices étaient liés à des situations réelles.						
21.	J'étais bien préparé pour faire l'exercice						