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# *Learning Academic Language through Science in a Chinese Kindergarten*

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***Keywords:*** Academic language, early literacy, disciplinary learning, science learning

***Abstract:*** This essay explores the need for high-quality English Language Learning programs in China, particularly in kindergarten classrooms. English is widely regarded as an important skill for Chinese students. However, there is little research on academic language learning in Chinese kindergarten English curriculum, and little is known about the kinds of instructional practices currently taking place in English as a foreign language classrooms. The essay argues that integrating scientific inquiry and disciplinary literacy instruction may be an effective approach to promoting academic language use in Chinese kindergarten classrooms. The essay reviews academic language learning in early years for English language learners and discusses the importance of promoting academic language use in achieving long-term academic success.

## 1. Introduction

Around the world, legislators are establishing earlier starting ages for the study of foreign languages in schools [1]. Due to its widespread use as a common language, English is frequently used as first foreign language[2].

Feng[3]described Chinese parents attitude towards English learning is ”unprecedented for very young learners”. The reasons behind the phenom may vary. First of all, Chinese parents fear missing the "critical period" for acquiring a second language because they adhere to the philosophy that "earlier is better." Secondly, achievement in English is seen as a crucial part of one's total competence and competitiveness, as well as a key means of advancing one's schooling and opening up new employment opportunities [4,5]; therefore, the instrumental motivation is quite high. Thirdly, an earlier investment in English education is thought to have a higher return at a cheaper cost. Last but not least, because English is not just used in traditional classroom settings and for exam purposes, intrinsic motivation has reached previously unheard-of heights [3].

The Chinese government has started regulating when English lessons can begin in schools since 2021. Currently, schools are not permitted to begin teaching English at a grade level before the first grade, with the justification that doing so will enhance "equitable access" (Since not every kindergarten possesses the capacity to teach English due to lack of teacher resource). However, as study showed, parents from backgrounds with higher socio-economic status (SES) are more likely to be able to afford to send their kids to private schools. Those parents with higher SES also tend to give their kids extra direct and indirect support in their English learning by paying for private EFL sessions.This phenomenon is widely seen in big cities like Beijing, Shanghai, and Guangzhou [6].

As a consequence, high quality of English Language Learning Program is needed in China.

However, there is little research focus on the academic language learning in Chinese kindergarten English curriculum. In contract, some recent research in USA has begun to investigate teacher practice around academic language in mainstream classrooms [7]. Furthermore, little is known about the kinds of instructional practices currently taking place in English as Foreign language (EFL) classrooms. Since research shows that in elementary schools and beyond have found a connection between achievement in academic language and success in literacy and the content areas [8,9]. Additionally, children who are adept in academic language may comprehend textbooks in their subject areas more easily [10], which may encourage long-term academic success [9]. Many of the individual features of academic language have been associated with later academic achievement, including decontextualized talk [11], complex syntax [12], and academic vocabulary [13].

This article is a practical exploration of an integrating scientific inquiry and disciplinary literacy instruction approach in a Chinese kindergarten classrooms. I will discuss the research regards of academic language, review academic language learning in early years for English language learner, and discuss ideas for promoting academic language use through integrating disciplinary literacy instruction with scientific enquiry in a Chinese kindergarten classroom.

## 2. The notion of Academic English

Despite the fact that academic language has been characterized in a number of different ways in the research literature, it is generally acknowledged that it is crucial to academic achievement and qualitatively different from the conversational language that is used outside of the classroom [14-18]. Nagy and Townsend [19] defined academic language as the specific language used in academic settings, both verbally and in writing, to promote communication and critical thought about disciplinary material. Academic language is distinguished by the use of complicated syntax, embedded clauses, specific discourse functions, and decontextualized speech. It also includes a sophisticated or academic vocabulary, containing exact phrases uncommon in informal conversation.

## 3. Academic language Learning in early years for English language learner

With more expectation has been put on how childhood education and care (ECEC) effectively prepare children for primary school, ECEC is no longer an environment for social play and care only. As the early and successful development of academic language skills lays the ground for literacy and the educational career in general, language awareness as well as knowledge and abilities concerning language acquisition and support are of focal interest in these discussions [13].

It is widely accepted that students must learn to use specialized forms of language before they can successfully participate in mainstream content-area instruction. This is especially true for students who are language learners whose first language is not English. One version of this argument was made by Cummins [20] several decades ago. Focusing on students in the United States who come from places where English is not the first language, Cummins claimed that basic interpersonal communication skills (BICS) were less cognitively challenging and more contextualized when compared with cognitive academic language proficiency (CALP). He also asserts that BICS may be mastered/acquired in 3-5 years, while CALP typically takes 5-7 years to master [21]. Although discussions about Cummins' model has been generated among sociolinguists and educators [14, 22, 23], it is still influential. More and more scholars suggest to recognize the challenge the English learner faces caused by the difference between social language and academic language which explicit instructions need to be implemented to support English learner to become

proficient in English. Short et al. [24] argued that teachers must consider the differences between social and academic language, as well as the characteristics of academic English, but the underlying assumption remained that the language used in everyday contexts is fundamentally different from that used in academic spaces and that this difference is the key to understand the challenges facing students from non-dominant linguistic backgrounds and how these students might best be supported in academic settings.

Prior studies have repeatedly shown that after the early elementary school grades, language skills become the primary source of variability in predicting reading comprehension for native English speakers and English learners (ELs). In fact, the early childhood years represent a “critical period” for vocabulary learning [25]. Explicit language instructions, which include conversations and embedded linguistic support linked to vocabulary growth [26, 27], acquisition of complex syntax [28, 29].

Although these language skills have remained imprecisely defined, a few studies have suggested that in addition to vocabulary knowledge, morphological and syntactic skills are also predictors of reading comprehension in both native English speakers and ELs [30-32]. Only a third of U.S. students in grade 4 read and comprehend at a proficient level [33]. One reason for these deficits is that 73% of U.S. 9-year-olds demonstrate only “partially developed” inferencing skills [34]. Thus, targeting inferential-level, academic language skills must become a focus in this study.

It is widely acknowledged as an excellent strategy to encourage students' academic language development to integrate disciplinary literacy into subject instruction. Isidro, E. I. [35] found that integrating disciplinary literacy instruction with basic engineering thinking could serve as a place for disciplinary literacy skills to emerge among K-2 students. When Teacher scaffolding and developmentally appropriate materials and tasks were provided, evidence of emerging disciplinary literacy skills among the young learners were shown.Integrating language and content instruction is important for working effectively with ELs [36-38]. Basically, integrated language and content instruction is task-based instruction that focuses simultaneously on relevant knowledge, skills, and academic language within a subject area. The academic language includes the key concepts, vocabulary, grammar, and discourse necessary to accomplish subject-area tasks and activities. Effective instruction involves designing and delivering lessons that make content comprehensible and that facilitate language acquisition [39]. Kamberelis&Leonard [40] argued that through integrated content and language instruction, second-language learners develop the ability to generate thoughtful spoken and written discourse about concepts in a specialized subject area, and they develop proficiency in understanding and producing the types of texts specific to that area.

## 4. Method

The study was conducted at a Chinese early childhood education institution located in Chongqing, which offers an English immersion program from pre-kindergarten to kindergarten. The focus of this study was on the curriculum exploration through integrating disciplinary literacy with science learning among Chinese kindergartners aged 5 to 6. The data sources for this study included my daily observational field notes, video recordings of classroom instruction, photos of student artifacts, and post-program teacher interviews. The following sections provide a detailed description of the curriculum exploration.

### 4.1 Curriculum Exploration through Disciplinary Literacy - Science Learning Integration:

In this case study, it was found that integrating disciplinary literacy instruction with science learning could provide a platform for disciplinary literacy skills to emerge among K-2 students. To provide a contextual description of how this was achieved, the different aspects of the curriculum

exploration are discussed.

### 4.2 The Teacher.

As the director of Autumn Tree Teaching Research & Management, I worked with Mr. Chen, who was the teacher of Autumn Tree kindergarten. Mr. Chen taught the Theme Class, which covered social and science themes teaching. I met with Mr. Chen on a daily basis and oriented him about the science theme-based learning plan. I also designed the teaching procedure and shared teaching materials with him. I provided him with teacher training based on Next Generation Science Standard (NGSS) and 5E model (engage, explore, explain, elaborate, and evaluate) to demonstrate how a lesson could integrate disciplinary literacy with science learning. For the rest of the curriculum, I became a participant observer in his classroom, where I assisted in facilitating instructional activities during class.

### 4.3 The Students (Kindergarten)

All of the students were enrolled at Autumn Tree and had been studying there for two years. They had all received explicit English instructions for at least one year. There were 15 students in total, aged between 5-6 years old.

### 4.4 Instructional Design

Based on the review of research on academic language, the following instructional components were included in the instructional design:

(1) Explicit vocabulary instruction within meaningful contexts that included visual supports, simplified definitions, and gestures;

(2) Using disciplinary literacy to generate inferential-level conversation prompts with scaffolded adult supports to student verbal responses;

(3) Personal writing prompts to encourage students to use academic vocabulary and apply their science thinking habits.

## 5. Discussion

Table 1: 5E Process embeded with Language instructions to support academic language development

| 5E Process | Scientific Practices | Instructions |
|---|---|---|
| Engage<br>• Engaging students in topics that trigger their prior knowledge | Asking Questions | Having class discussion, asking questions they want to learn.<br>Sketching to active their prior knowledge, conversation were stimulated from the sketch. |
| Explore<br>• Students exploring further through literacy involved activities | Planning investigations | Reading articles or watching related documents<br>Drawing observations |
| Explain<br>• Students providing explanation<br>•Teacher providing the necessary vocabulary, concepts and explanation | Construct explanations for science | Teaching/learning structure of explanations<br>Drawing explanations |
| Elaborate<br>• Students applying their new knowledge to related but new situations | Engaging in argument from evidence | Having class discussion |
| Evaluate<br>• Students present what they have learned<br>• Teachers evaluating students' conceptual understanding | Communicating Information | Presenting explanations |

Instead of adopting and strictly adhering to one lesson, I identified the following common components across the life science unit learning. This unit covers four topics, including ants (insect), frog (reptile), bear (mammal), and bird. Each topic lasts one week of learning. For each animal, the curriculum is designed to focus on their body parts and behaviors, which could prompt the students' personal observation and description capacity through learning.

Table 1 provides detailed information about the language instructions embedded in each step of the 5E process. It describes the instructional supports performed by the teacher.

### 5.1 Step 1: Engage

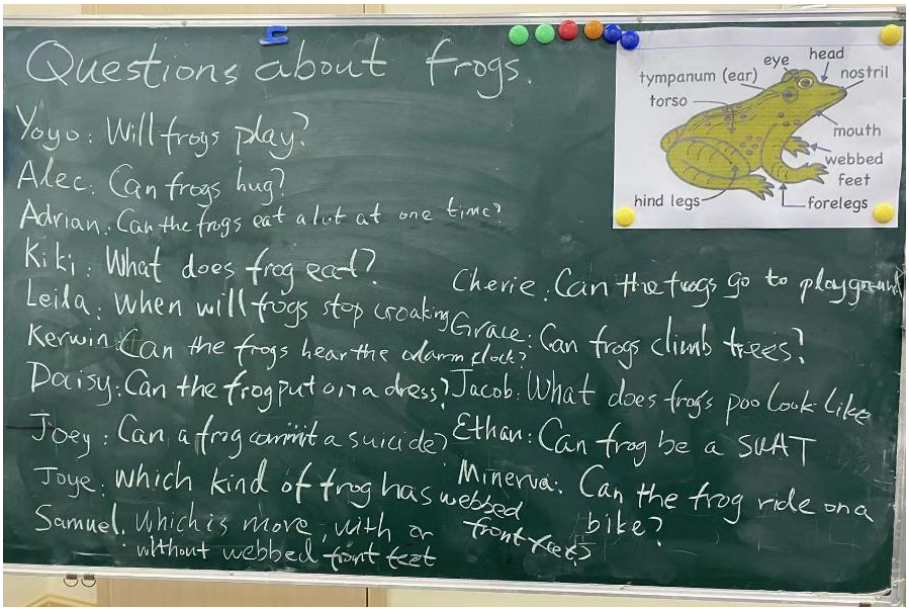


Figure 1: Questions that students asks about what they want to know about frogs

For the Engage step, it is important for the teacher to not only engage students' interest but also activate their prior knowledge. In this phase, the teacher asked students what they wanted to know about ants, which triggered their own motivation to investigate ants. The whole-class discussion also promoted their use of language to ask questions in a scientific way. For EFL students, a lack of related vocabulary and the ability to construct a complete sentence may hinder them from asking questions. The teacher allowed them to use Chinese words to construct their questions. After they expressed the questions they wanted to ask, the teacher helped them reconstruct the questions in English. Students then repeated the question in English. That was the first time students learned academic vocabulary related to the topic and how to ask questions like scientists. Figure 1 shows the questions that students asked about what they wanted to know about frogs.

After the students generated questions about animals, Mr. Chen gave them a comparison diagram sheet to allow them to sketch what they already knew about the topic. Figure 2, Comparison Diagram, and Figure 3 show an example of a student's sketch about what they already knew about ants' colonies. The sketch reveals that the student already knew that ants' colonies are built around rocks with plants around them, but they had little knowledge about what was inside the ants' colony. During the sketching process, the teacher walked around and facilitated students to discuss their prior knowledge in English. After sketching, Mr. Chen invited some students to share their sketches and scaffolded their answers with sentences starting with "I think..." After sketching and thinking on their own and with the teacher's facilitation, all the invited students could use complete sentences to describe what they already knew about the topic.

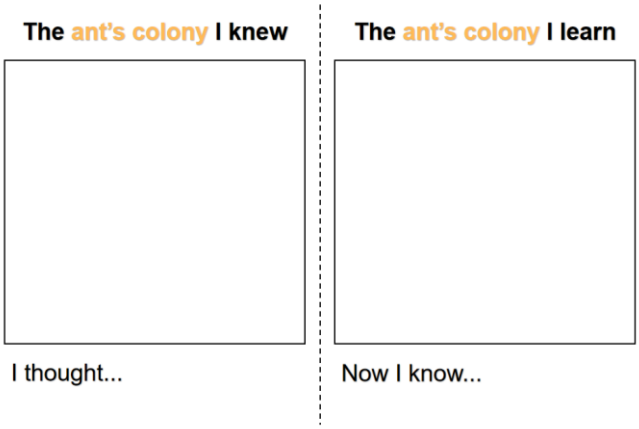


Figure 2: Comparison Diagram

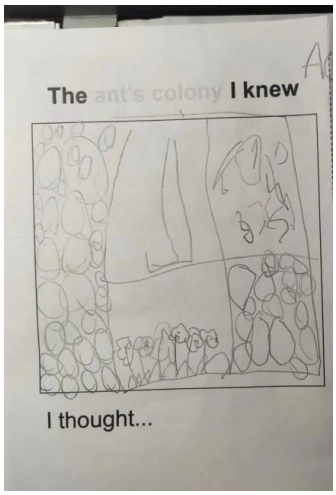


Figure 3: The sketch about what he already knew about ant's colony

## 5.2 Step 2 Explore

Table 2: List of trade book and academic vocabulary used on ants topic

| Topic | Main Content | Anchor Texts Reads | Academic vocabulary |
|---|---|---|---|
| Ants | Ants' Body Parts | Can an Ant Carry Me? By Meg Greve(2008) | Abdoman, Throax, Head, Hindleg, Middle Leg, Foreleg, Antennae, Eyes, Mandible |
| | Ant's Colony | Animal Engineers: Anthills, Focus Readers (2018) | |
| | Ants' Different Jobs | The Ants' Secret, by Baltasar Magro and Dani Padron(2019) | Queen, Worker, Soldier, Princess, Drone |
| | Ants' life cycle | National Geographic Readers: Ants (2011) | Egg, Larva, Pupa, female, male, Queen |

On explore step, anchor texts and videos were used to introduce vocabulary and help students learn the content knowledge through comprehending the texts. A Large bodies of research indicate that children who read more frequently have larger vocabularies and demonstrate better reading comprehension over time [41, 42]. Selecting high-quality texts may help children develop stronger understandings of academic language. Children benefit from hearing vocabulary terms presented in well-formed sentences, which may be found in children's books. In selecting the texts, I considered whether the book covers the main content of learning on each lesson, and whether it uses academic

language properly. Table 2 give the list of trade book and academic vocabulary used on ants topic.

During disciplinary literacy instruction, Mr Chen helped students identify how academic language use more complex syntax convince information by translating the complex syntax into more simple utterances. Since Informational and Content Area Texts, Science, social studies, and math texts particularly challenging for young children as they have high proportions of nouns, contain large amounts of domain-specific academic vocabulary [43]. This means that children will need larger funds of academic vocabulary in order to understand these texts. On this step, Mr Chen also used action aid to help the students reinforce the memorize of new vocabulary.

After Read-Aloud session, Mr Chen asked the students to answer questions about what they learned about the topic. Through teacher scaffolded conversation, students could use the academic vocabulary they heard from the texts to summarize what they have learned.

## 5.3. Step 3 Explain

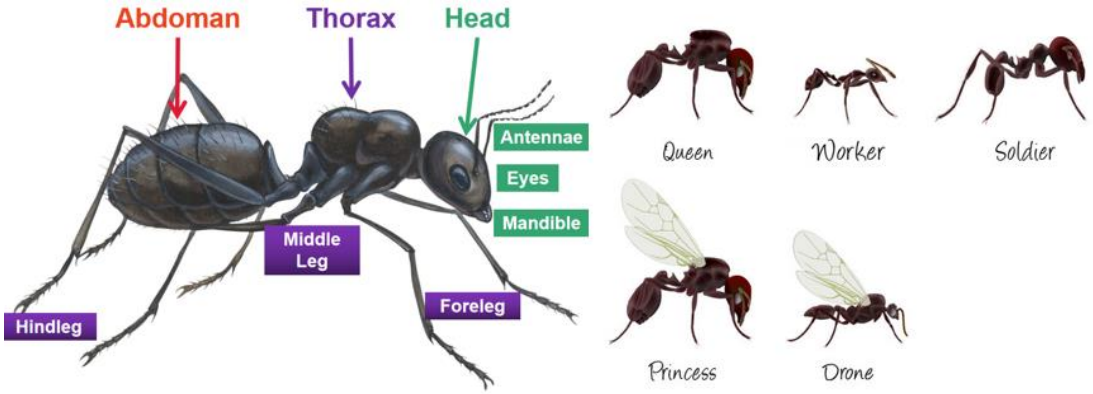


Figure 4: Academic Vocabulary visual aids on ants topic

During the Explain step of a lesson, teacher facilitate opportunities for students to share what they have learned from the texts. To help students construct evidence-based explanations, teacher might introduce students to the claim, evidence, and reasoning (CER) framework for crafting scientific explanations [44]. Academic vocabulary is also reinforced on this step. Figure 5 shows the visuals aids that teacher used to help students mater the vocabulary.

## 5.4. Step 4 Elaborate

The goal of the Elaborate step is for students to apply the knowledge and skills they have developed thus far in the lesson to a related, but different, context as that of the focal phenomenon or problem.

For example, on ants' body part session, after students have mastered the knowledge about ants' body parts and their functions. Mr Chen raised the question which a student has asked at the beginning of the topic learning: whether an ant can read. One of students gived the claim that ants cannot read. The student claimed that he drew this conclusion because he learned that ants have compound eyes which are only sensitive to moving objects. If reading materials are showed to ants, they cannot even recognize them because the materials are still. More questions were solved by students through inferential-level conversation. Figure 6 shows an example of one students sketching to answer the questions they arose at the beginning of the class. In the sketch, students' ability of inferring is shown. For example, the question "What does frog's popo look like?" Students could use what they have learned about the food of the frog to answer the question, and also sketch based on their guess.

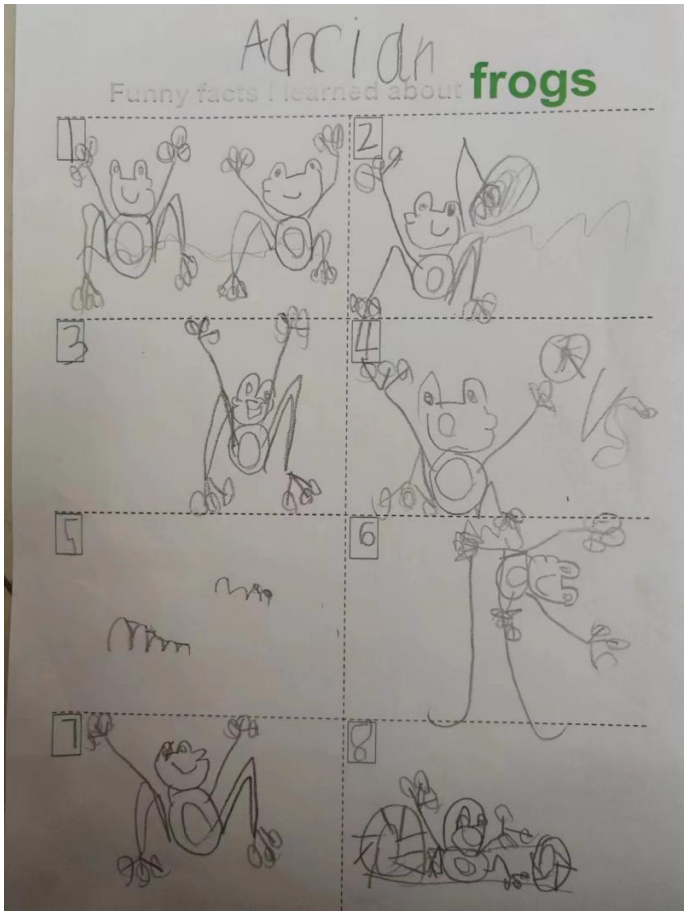


Figure 5: Academic Vocabulary visual aids on ants topic

### 5.5. Step 5 Evaluate

On this step, teacher promoted the use of academic language by giving them the opportunity to present what they have learned by using decontextualized language, and adjust their language based on the knowledge level of the students. There were two ways that students use to show what they have learned.

The first way is to give a presentation to their parents. Presentation board were made by their own through cooperation within a group. The show content of their learning by drawing and writing. Mr Chen used explicit prompts to focus the child's attention on the audience and guides the child to consider what the audience does or does not know. Teacher encouraged children use of academic language they have learned in this unit.

With adequate instructions on academic vocabulary and disciplinary literacy comprehension, students ability to communicate information with academic vocabulary and complex sentence was appeared on their writing task. Figure 7 are example of students' birding journal. As shown in the journal, they can writing words of bird's body parts and also can use descriptive language to record their observation of the bird.


Figure 6: Students presentation to parents about Ants topic

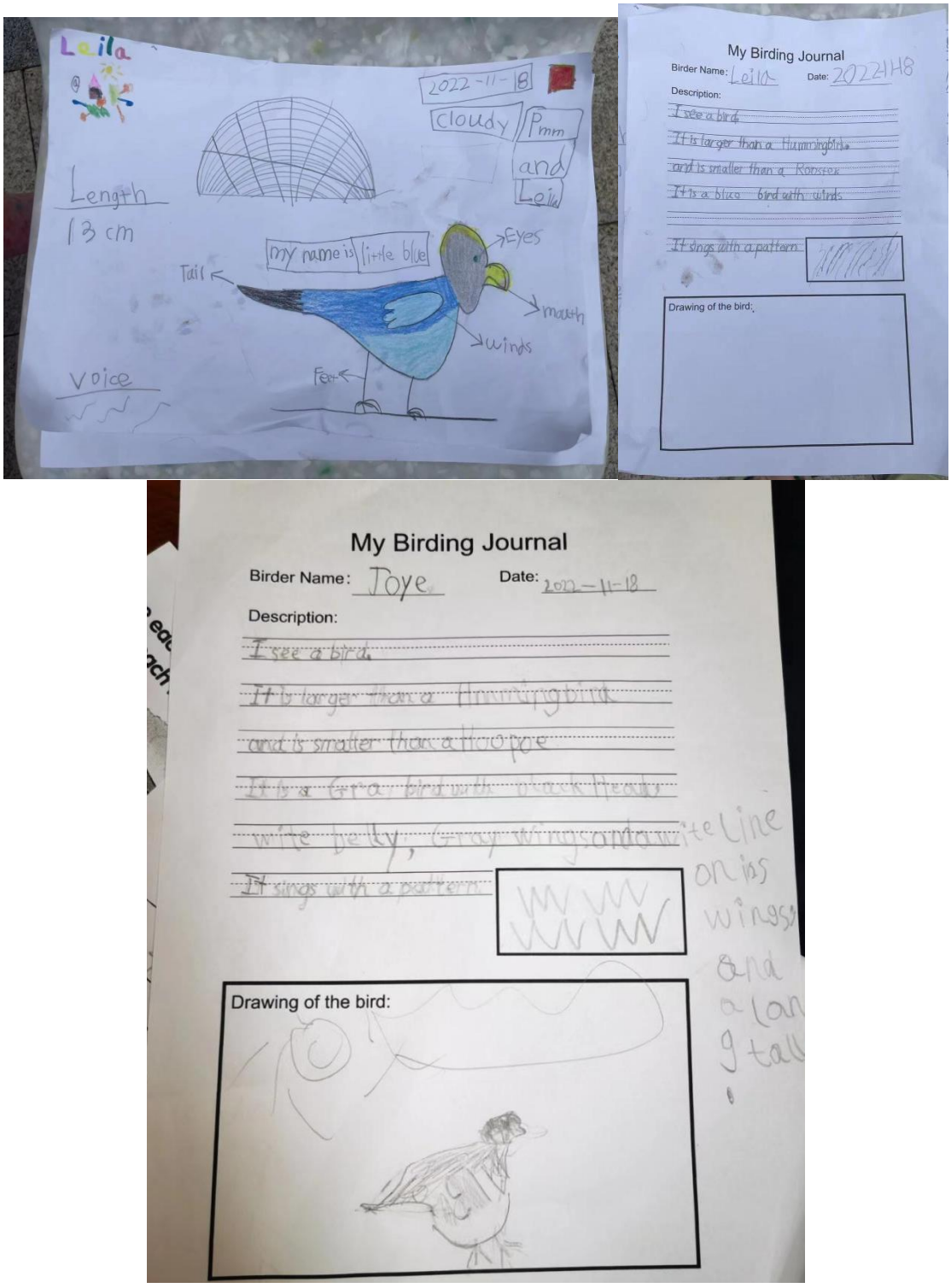


Figure 7: Students' Writing Sample of Bird Journal

## 6. Conclusion

Early childhood is a period full of opportunities to foster children's academic language development. Even for EFL students, with high-quality instructions integrating disciplinary literacy with scientific inquiry, they may have success in future English-based subject learning. In this

instance, EFL kindergartners' academic language was promoted through language instructions embedded in science learning. Through students' presentations and writing tasks, students' academic vocabulary and skills of inference were revealed. Although limited in scope, this study could serve as an example and provide encouragement to teachers exploring academic language use in similar EFL kindergarten classrooms.

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