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A Hypothetical Syllabus for a School Teacher Training Course : Making a Science Picture-Book or a Kamishibai Based on Experience of Each Student

Tsubasa Hidaka*

This paper proposes a course syllabus that is the outcome of research conducted to contribute to the improvement of the pedagogy and curriculum of a teacher training program. The proposed syllabus is grounded in the author's practical experience of instructing students on the requisite coursework for *Teaching Theory and Practice: Science 2*, an elementary school subject specialty in science for the school teacher training program at the Faculty of Contemporary Human Life Science at Tezukayama University.

I. Introduction

The author of this syllabus was transferred to Tezukayama University in 2018 and has since been charged with the delivery of the course curriculum of *Teaching Theory and Practice: Science 2*, an elective specialist course meant for non-science education students who wish to be licensed for the instruction of science subjects as prospective elementary school teachers.

This subject is offered in the second half of the fourth year of the bachelor's degree and may be selected by students toward the attainment of their elementary school teacher's license. In fact, students can obtain their license by taking other specialized subjects such *as Teaching Theory and Practice: Japanese Language 2* or *Teaching Theory and Practice: Social Studies 2*. In addition, many students aim to acquire three teaching qualifications, enabling them to become nursery, kindergarten, and elementary school teachers.

The author of the proposed syllabus has been conducting specialized courses on science and environmental education for the last three years with the aim of offering this elective to students of all three qualifications, and not merely to those who wish to obtain the license to teach elementary school students. The proposed program of study is a tentative design derived from the author's own pedagogic practice of asking each student to produce a science picture -book or kamishibai.

Many studies have been conducted on science picture-books and kamishibais.[1)] Numerous extant studies have also verified the positive effects exerted on young children by the reading or storytelling of science picture-books and kamishibais.[2)] However, very few existing studies have required students to create original works.[3)]

Although this proposed teacher training syllabus is still in the tentative stages, it is presented as a draft to seek criticism, future directions, advice, and guidance. The undue haste in proposing this syllabus may also be attributed to the imminent reorganization of the Faculty of Contemporary Human Life Science, which will become the Faculty of

* Faculty of Education, Tezukayama University, Junior Associate Professor

Education, from the next academic year. Thus, there will be a qualitative change in the students who attend this course from the next year.

II. Program Configuration Objectives

1. Focusing on a student's direct experience

According to Hiroki (1983), the recognition of nature comprises two fundamental stages: the identification of the existence of things and events, followed by the detection of the relationships between things and events. The second stage cannot precede the first stage, because the first stage is forms its basis. The first step in the understanding of nature is direct experience. The author's students were first reminded of the significance of direct experience as the starting point of science. They were then mandated with the creation of a science picture-book or kamishibai that would lead readers to the recognition of nature.

2. Expressing ideas succinctly through images and short sentences

The target audience for the picture-books or kamishibais was established as children ranging from infants to the lower grades of elementary school because of three reasons. First, the readership was deemed to be apt and customized to the students of the course, who seek certification to teach at nursery, or kindergarten schools. Students who desire to be elementary school teachers also often opt for nursey or kindergarten teacher qualifications as sub-licenses, and there is a great degree of interest in infants and children in lower elementary schools. Second, limiting the target audience to this age range would equip students with specific techniques to express their ideas using short and concise expressions. Hidaka, Hiroki & Tanzawa (2015) have emphasized that long and detailed statements cannot be understood by young children. Thus, ideas must be conveyed to them concisely and in simple text. Put differently, vocabulary must be carefully selected to clearly convey the required ideas in a limited number of characters. The training, imparted from the production of an original text would lead to improved teacher-student communication skills in the prospective instructors and would also ameliorate their board writing skills. Third, as indicated by Hiroki (2004), to make children who read the book and kamishibai interested in things and phenomena in the natural world, and to turn their attention to the outside world by reading. If the readers are assumed to be in the upper grades of elementary school or older, the prospective teachers could delve into the idea of how to further explicate in an easy-to-understand manner, content that their students have fundamentally grasped on their own. However, if young children are targeted, they would naturally fall outside the purview of a deeper understanding of an already comprehended idea.

3. Inculcating awareness of the connections between real life and science

Students who have attended other subjects taught by this author such as *Teaching Theory and Practice: Science 1* and Teaching Methodology of Science have sometimes offered feedback such as "I noticed that science was everywhere." In traditional curricula, the learning of scientific knowledge is imparted and understood within the closed world of

schools for regular examinations and entrance examinations. Science is thus misunderstood as an entity independent of the real world. The proposed syllabus forces students to develop story-based knowledge on the basis of their own experiences and on the naive questions they asked in childhood, rather than on the learning they have attained through schooling. Therefore, the consideration of scientific themes also leads students to the re-recognition of the ways in which science permeates individual lives and connects daily realities. In other words, the activities of this syllabus ensure that the students themselves apprehend the connections between science and the real world and real life. In addition, the very production of the picture-books or kamishibais requires students to apply their scientific knowledge, so that related learning can be gathered through real feeling. In this way, students who want to be teachers are compelled to feel the connection between real life and science through the process of making a science picture-book or kamishibai. They are then encouraged to consider the necessity and purpose of science education. This objective is one of the primary drivers of the proposed syllabus.

4. Leveraging the fun elements of a story

A good class practitioner does not merely deliver a lecture in class. The creation of a science picture-book or kamishibai requires prospective teachers to first understand how to effectively draw readers into the narrative realm by making the protagonist go through unexpected developments such as failing in the middle of the story and so on. The story would not be interesting in the absence of conflict or a setback of some kind. Katahira (2011) has stated that science learning is not merely the process of increasing new knowledge; it is also the process of rectifying the preconceptions or misconceptions of learners so that they attain the correct scientific concepts. Further, science learning is also a process of conceptual transformation, which represents the most important feature distinguishing it from the learning of other subjects. Good teachers can thus utilize the gap between a child's misconceptions (the child's naive thoughts before the teacher intervenes) and the proper scientific notions (what the teacher wants to impart) at the beginning of a science class.[4] This type of intervention stimulates the child's natural inquisitiveness and enhances learner interest by encountering unexpected things and phenomena. The tentative plan presented here is nothing other than the applied process of conceiving a narrative that would draw the reader's attention as it focuses on direct experience: a process very similar to an effective science class. Therefore, the exercise of producing a science picture-book or kamishibai provides students tasked with this activity the opportunity to think about planning science lessons.

III. A Tentative Plan

1. Subject, Duration, and Objects

Subject: *Teaching Theory and Practice: Science 2*

Duration: 1 90-minute class per week, a total of 15 sessions

Objects: Bachelor 4th grade non-science education students of the Faculty of

2. Concept

This developmental concept highlights "thinking and trialing" rather than "making and completing." Therefore, students do not determine the theme of their picture-book or kamishibai almost until the middle point of the program.[5] Takigawa (2006) states that "scientific picture-book creators, regardless of whether they deal with nature (animals and plants or the natural world) or natural phenomena, have a natural awareness of what they want to convey through their scientific picture-books. It is thus necessary for the creators to draw their illustrations within the limitations of the number of pages using the skills of 'narrativeness' and 'point of focus'." Put differently, the creation of a scientific picture-book or kamishibai that require the deliberate tickling of a reader's inquisitive mind is a production activity apparently aimed at "young children." In reality, however, the thinking activity is directed at the author of the work.

Table 1 outlines the proposed program. In addition, because it was not possible to accomplish the actual bookbinding in class, this tentative plan assumes the completion and presentation of a digital work[6] that can be presented to children via PowerPoint or other non-physical visual means.

Table 1: The Details of the Program Outline

		In-class activities	Activities accomplished outside the classroom
1	Themes and development of concepts	◇ Introduction to the outlook and direction of the course ◇ Instructions for activities (Students are asked to classify objects that they think are science picture-books and kamishibais and those that are difficult to judge) ● To the extent that it is possible, excerpts from scientific picture-books and kamishibais available in the university's libraries are demonstrated during class hours	● Students must categorize science picture-books and kamishibais, including works that students may have been exposed to or liked in their childhood
2		● Contemplate and postulate the definition of a scientific picture-book and kamishibai on the basis of the classification table generated as a result of the previous in-class and at-home activities ◇ Students share the classification charts created by them with their peers and present the professor with a new perspective on the significance of creating science picture-books and kamishibais ● Class discussion on experiences and thoughts that may become inspirations for science picture-books or kamishibais: individual experiences of nature, past experiences related to picture-books and kamishibais, and personal childhood wonders	● Students must contemplate and report on three themes tackled by science picture-books and kamishibais through their own research of commercial books and their personal childhood experiences

3		● Each student presents some candidate themes discovered through the previous at-home activity and obtains peer feedback ◇ Professor feedback and advise on the appropriate steps to the production of the original work, its scientific accuracy or suitability for the age of the target audience, and so on	● Students must collect information related to their themes of interest
4		● Focus on one theme ◇ Presentation of references for scientific events, experiments, picture-books, comics, poetry collections, photo books, etc.	● Students generate some story ideas for further development
5		● Rethink the concept of the subject ◇ Presentation of references for scientific events, experiments, picture-books, comics, poetry collections, photo books, etc.	● Create a page-aware plot
6		● Modify plots, focusing on content and expansion ● Devise how to express and showcase the work in a manner appropriate to the targeted stage of child development	
7		● Modify plot primarily in terms of its expression and composition ◇ Lecture on written expressions	
8	Making pages and front covers	● Page making: Illustration 1[7] ◇ Advise students to better link their science education knowledge and skills with the work they are producing	● Self-study and self-improvement of the tasks required for students to undertake the task of work production
9		● Page making: Illustration 2 ● Students advise each other	
10		● Page making: Illustration 3 ● Students advise each other	
11		● Page making: Writing 1 ◇ Advise students to better link their science education knowledge and skills with the work they are making	
12		● Page making: Writing 2 ● Students advise each other	
13		● Page making: The afterword ◇ The professor further elucidates and hones the topics students desire to convey to readers through their work	● Students complete illustrations and written text of all the pages of the book
14		● Students share and inspect each other's work and make final improvement checks ● Digitization of produced original works[8] ● Using a personal computer to retouch pictures, adjust composition, and input characters	● Completion of the digital science picture-book or kamishibai by students

15	Summary	● Students read their work to others ● Students collaborate on their work ● Professor leads an interactive discussion as students reflect on the lessons learned through this production	● Students deliberate on how they can use their original productions in nursery schools, kindergartens, and elementary schools

mark:◇…professor support, ●…student activities

IV. Works

Table 2 overviews the picture-books and kamishibais produced by the students.

Table 2: Examples of works produced

Scientific branch	Title	Abstract	Authorial intention
Physics, Chemistry	*Himitsu no Roketto to Sora no Tabi (Space Travel with a Secret Rocket)*	A boy went on a space trip with his grandfather. When he came back to Earth, his family and friends were already dead	Creating interest in the appearance of stars in the universe and explaining the flow of time
	Kumo tte Naani? (What Is a Cloud?)	A boy on a family trip is on an airplane. Looking out of the window, he is anxious that his plane will collide with clouds	Inviting interest in the properties of water
Biology, Geology, Environment	*Fushigi na Byouin (Mysterious Hospital)*	A red-eared slider (dodor) runs a clinic in a rural town wherein various animals complain of species-specific symptoms and come to see him	Inviting interest in the habits and characteristics of various animals
	Haiburiddo Ikemen Masaru-Kun (Handsome Masaru)	A boy struggles to look cool while consulting with various animals	Providing an opportunity to think about what attraction is for living things
	Kamaboko no Hi (Today's Menu)	A boy with strong likes and dislikes rediscovers food through a fictional device invented by his sister (goggles that can see the roots of things)	Invites readers to understand what food originally looked like in the natural world before its modern, black box, food-processed production
	Kusamura Daikyousou (Big Race in the Grass) [9]	Ladybirds, ants, beetles and snails enter a race. Since each animal has its own characteristics, various obstacles await them during the course	Inviting interest in the characteristics of various organisms and their relationships with each other

	Mimamotte iruyo Otsukisama (The Moon)	On the way home from school, the girl notices the moon is coming and is amused	Attracting interest in the movement and appearance of the moon
	Tane wo Tabetara (If You Eat Seeds…)	A boy ate a watermelon seed and is afraid that the seed will germinate in his body	Attracting interest in biological phenomena such as germination and digestion
	Tomodachi (Friend)	A protagonist (a native fish) plays with his best friend (an exotic fish). His friend is kidnapped and he goes on an adventure to find his best friend	A warning about the possible extinction of exotic species. Readers are queried about means of environmental protection

V. Conclusion

To remark on the accomplishment of the course objectives, it would be pertinent to offer some sample feedback comments by students who have experienced the proposed course.

One student comment reads "It's difficult to explain to children about things that don't actually touch like the moon or light." This statement indicates that the student was forced to cogitate about the ways in which children perceive nature. The impression, "I realized that in order to create something, I had to be accurate and had enough knowledge," proves that the student noticed difficulty in creating a large unit from his fragmentary knowledge. Other statements such as "It turns out that it will not reach the reader unless you narrow down the main points" or "In order to make it a work that can be read by many people, it is necessary to revise it into simpler word" evince that students realized the basic elements of conducting their own classes in the future. In addition, students described their reactions as "I noticed that there are many scientific picture-books on the market in the biological field such as animals and plants" or "I found that only picture-books that teach knowledge are not scientific picture-books." Comments such as these evidence that the knowledge of students with regard to scientific picture-books increased and that their understanding of knowledge-related content was intensified. A study by Deguchi & Kuwahara (2015) reveals that many teachers do not know whether books at their kindergarten are scientific picture-books. This fact can also be gauged from the impressions described by the students of the proposed course.

The overall impressions of the students and their performed output for the course lead to the deduction that the program was able to achieve the desired results in terms of its stated aims in section II. However, the proposed plans and methods of program development described here still need further consideration and improvement.[10] I would be grateful if you could advise me about ameliorating this proposal from the practical and theoretical perspectives.

Appendix

This paper represents content presented at the 29th Annual Meeting of the Japanese

Society for Environmental Education 2018. However, the material originally presented at the conference has undergone significant additions, modifications, and reorganization. I would like to thank Enago (www.enago.jp) for the English language review.

Notes

1) There are several reports that examined the transformation of children by reading stories, such as Okamoto, Kubo & Goto (2013) in elementary school science and Kotani, Nagase & Handa (2007; 2008) in nursery schools and kindergartens.
2) There are many studies on scientific picture books and kamishibais themselves, including Imai, Kurihara & Nojiri (2010), Takigawa (2003), and Yonemura (2013).
3) As a student's dissertation on making science picture books and kamishibais, there are practices based on a given theme, such as Inoue (1987) for college students and Shimonishi & Sasada (1981) for high school students. Hiroki (2004) for master's course graduate students and Hidaka, Hiroki & Tanzawa (2015) for high school students are the only class practice reports for students to set themes and produce works. According to my knowledge, there has been no research reported on the creation of a work from setting a theme for a bachelor's student himself.
4) A typical example is Ogasawara (2010).
5) Realistically, some students spend more than 70% of the total program in planning and take it home to produce.
6) Digital works were inspired by Shintani, Hirano, Inoue, Ueda, Miyata & Kaneda (2002).
7) The method of drawing is left to the student's independence, such as handwriting (pencils, crayons, and paints), photographs, and using a personal computer to minimize the influence of the goodness and weakness of the picture on the willingness to produce.
8) It is instructed that the personal computer may be used from any stage, such as from the first stage of drawing a picture, only the work of painting a color, or only the input of characters.
9) This work was created in the subject *Graduation Research*, but it is included here because it was created following the same procedure as this program.
10) In several cases, the creator himself does not understand scientific phenomena correctly, probably because it is not intended for science education students. Therefore, the professor must always pay attention not only at the stage of thinking about the theme but also at the stage of drawing. However, there exists a concern that if the number of students is too large, the class will not be established.

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