



Politicizing ‘Learning by Doing’: Shiono Naomichi and the Cultivation of the ‘Japanese Spirit’ in Primary and Secondary Science Education in Japan from 1931–1958

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Abstract

This article traces the development of the wartime Japanese curriculum, which was deliberately designed to implement ‘Japanese’ approaches to science, and its relation to the previously dominant educational approach, learning by doing. It examines the work of Shiono Naomichi (1898–1969), who served as the curriculum and textbook revision director for science and mathematics in the Ministry of Education from 1924 to 1944 and also authored several important textbooks up to the 1950s. While authoring two textbook series in the 1930s and 1940s, respectively, Shiono used learning-by-doing methods to implement ‘Japanese’ ways of thinking within his texts, in response to the demand for the promotion of Japanese spirit. In the succeeding post-war era, Shiono attempted to conceal the relevance of his pre-war and wartime textbooks to the wartime promotion of ‘Japanese’ thought processes and insisted on the educational superiority of his own textbooks over post-war American-style progressive textbooks. By analyzing his shifting claims on wartime education in relation to progressive educational thought, this article portrays the political function of science education and its concealment in post-war Japan. The rediscovery of the political implications of wartime textbooks, as well as a re-examination of their influence in post-war science textbooks, will enable us to critically scrutinize the political features of contemporary Japanese science education.

1 Introduction

Hands-on experiments were widely used in twentieth-century science education across the world, with some variations in the acculturation of the aims and methods in specific local settings. While scientific instruments, textbooks, and the ideals contained in them were freely exchanged, unique educational practices were established in accordance with each

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national and institutional context (Goody, 1990; Holmes, 1989; Kremer, 2011; Olesko, 2005). Japanese educators, like those in Western countries, embraced progressive educational ideas that advocated child-centered educational activities in the late nineteenth century and early twentieth century. In Japan, progressive educational ideas in science learning, such as nature study, Armstrong's heuristic methods, and John Dewey's concept of scientific thinking, were incorporated into a single educational method that emphasized active student engagement with experiment and observation, an approach that has been commonly described as 'learning by doing' (Itakura, 1968, pp. 279–312; Isozaki, 2017).¹ This ambition to introduce the learning-by-doing method was a part of the Japanese progressive education movement to change educational aims and methods, which continued until the 1920s. Newly established educators' associations and the Ministry of Education (MOE) supported this method, resulting in the establishment of science laboratories in secondary schools and the publication of laboratory guidelines (Mizuno, 2014).

The fervor for direct experiments and observations finally led to their implementation during the Second World War, when the MOE issued the National School Edict (*Kokumin gakkō rei*) for primary schools in 1941 and the Secondary School Edict (*Chūtō gakkō rei*) in 1943. Later historians of science and science education praised the wartime curriculum and textbooks for being full of student-friendly activities such as collecting plants or breeding small creatures, as well as student-led experimentation (Itakura, 1968, pp. 364–382). The only criticism of the textbooks was that they focused extensively on military-related technologies such as firearms and submarines. In light of such appraisals, the wartime elementary science textbooks were reprinted in 2009 with the intention of discovering and reevaluating wartime educational practices (Monbu Kagakushō et al., 1941/2009). The supporters of reprinting shared the view that, as long as the war-related technologies were to be ignored, wartime textbooks continued and furthered the earlier ideas of learning by doing and thus still had something to teach us.²

However, this rather straightforward description of the introduction and development of learning by doing methods does not explain why experiments and observations were actively promoted during the war. Student-led observation and experimentation performed a special role in promoting wartime ideology; wartime textbooks were deliberately designed to replace 'Western' approaches to science in favor of practicing 'Japanese ways of thinking', through student-led observation and experimentation. This multifaceted role of science education in building a nationalistic ideology has been underestimated by historians. This tendency stems from the idea that science education has been primarily concerned with intellectual and material advancement and less concerned with moral and cultural development (Roberts, 2012). After the Manchurian Incident in 1931, the Japanese government attempted to inculcate nationalistic sentiment at the same time as improving scientific competency in science education and related fields (Huh, 2020; Okamoto, 2018). The wartime curriculum reform aimed to instill Japanese indigenous thinking into students and to promote it as a moral and spiritual guide so that they would serve as loyal imperial subjects of the Emperor of Japan.

¹ 'Learning by doing' refers to educational methods of direct experimentation and observation by students, which were typical activities in pre-war Japanese progressive education. Civilian educators enthusiastically embraced and actively promoted this concept as the basis for a new educational method to replace government-led didactic learning.

² This project of reprinting wartime elementary school science textbooks was organized by the Ministry of Education and volunteer educators. The afterword to the book positively evaluates its emphasis on "children's sensitivity and spontaneous inquisitiveness."

This study aims to show that wartime educational practices fundamentally owed their principles to a previously dominant educational approach, namely learning by doing. Here, the link between educational ideals and their political functions was crucial and negotiable. Originally inspired by progressive educational ideals of science education, experiments and observations were used to cultivate 'Japanese' ways of seeing, thinking, and handling objects, which were designed to replace 'Western' styles of 'doing science'. To examine this transformation, I investigate the work of Shiono Naomichi (1898–1969), who served as the curriculum and textbook revision director for science and mathematics in the Ministry of Education from 1924 to 1944 and also authored several important textbooks up to the 1950s. His two textbook revisions in 1935–1940 and 1941–1945 will be used to examine the promotion of 'Japanese spirit' (*Nihon Seishin*) in its relation to progressive educational thought. This promotion sought to cultivate 'Japanese' thought processes as a countermeasure to Western scientism, which was believed to be in serious crisis. As part of this skeptical sentiment towards Western modernization during the Second Sino-Japanese and Second World Wars, Japanese approaches to scientific practices were promoted to overcome Western thought processes (Kanamori, 2004).³ For Shiono and other educators, there was little conflict between progressive educational ideas for scientific thinking and their own nationalistic ideas of 'Japanese ways of thinking.' The wartime curriculum and its fundamental principles should be examined in relation to nationalist ideology and the accompanying ideological conflicts over proper educational practices.

While focusing on how learning-by-doing came to support nationalistic curricula and textbooks, this study also looks at how the wartime ideology of 'Japanese' ways of doing science disappeared or was concealed in post-war educational discourses. Shiono was one of the post-war pioneers who advocated reverting to wartime textbooks in a post-occupation educational revision. In post-war Japan, during both the American occupation and post-occupation periods, there was an extensive effort to re-evaluate wartime educational ideas by comparing them with post-war American-style progressive educational thought. Shiono criticized the American-style curriculum, which was designed to demilitarize and democratize Japan's wartime science education, as he believed that the ideals of 'Japanese science' in the 1930s had already superseded progressive education. His campaign was entirely reliant on his rewriting of the history of wartime science education, in which he concealed the nationalistic ideologies in wartime educational practices. Previous studies, which have solely been concerned with intellectual and material advancement, share this disregard for nationalistic ideology. This study highlights the forgotten link between wartime science education and nationalism, as well as its historical recovery; this is critical to understanding the politics of science education both then and now. By focusing on the fundamental role of science education in instilling wartime ideology, this study draws upon recent research in the history of science education, which has examined educational practices from the perspective of cultural and moral instruction for the purpose of nurturing ideal scientists and citizens (Kohlstedt, 2010; Lövheim, 2014; Roberts, 2012; Rudolph, 2005). By employing concepts from science studies and related disciplines, researchers have demonstrated how educational ideas and methods are intertwined with political, economic, and social settings, unevenly affecting individuals, groups, and nations. This article contributes further to the literature by tracing Shiono's educational agenda and showing how his campaign was entangled with nationalist ideology.

³ For more on the cultural context in wartime Japan and an English translation of the conference for Overcoming Modernity, see Calichman (1943/2008).

In order to understand Shiono's educational agenda as it was practiced, this study analyzes his textbooks as well as the articles and essays he published in educational periodicals. The first section of this study contextualizes Shiono's wartime curriculum and textbooks in view of two interwar educational movements: the progressive education movement and the 'Japanese spirit' campaign. The second section examines Shiono's rationale for criticizing American-style science education by comparing his post-war recollections with his wartime explanation of 'Japanese ways of thinking.' The third section situates Shiono's post-war promotion of the wartime science curriculum in the post-war political context and clarifies the curriculum's political function. The final section offers some important historical reflections on the idea of 'Japanese ways of thinking' in post-war Japan.

2 Progressive Education and the Promotion of 'Japanese Spirit' in Pre-war and Wartime Japan

Progressive educational thought was introduced to Japan in the early twentieth century as part of the world-wide progressive education movement. Especially after the First World War, Japanese educators embraced various pedagogical theories drawn up by Johann Friedrich Herbart, Henry Armstrong, Johann Heinrich Pestalozzi, and John Dewey, all of which were collectively understood to comprise progressive education. Its advocates promoted student-centered learning as opposed to passive learning, which was defined by a reliance on memorization and an overemphasis on lecture-centered teaching. In the field of science education, students' direct observations and experiments were promoted as new approaches to pedagogy. Newly established teachers' associations, *Rika Kyoiku* (science education), and teachers at new experimental schools made efforts to apply new educational methods by adopting observational and experimental activities. Their desire to integrate more hands-on activities into the curriculum was realized by the Japanese government, which sought to invigorate the nation's research and development activities. The Diet approved a special budget for constructing science laboratories at all junior high schools and normal schools (teacher-training institutions). Progressive educators welcomed this. Although state investment was motivated by the goal of building a scientific workforce, progressive educators saw the state initiative to promote student engagement with experimentation and observation as running in parallel to their ideals of learning by doing (Itakura, 1968, pp. 269–312).

Another aspect of these progressive reforms was the introduction of a new secondary school textbook called *Ippan Rika* in 1931, which was modeled after the US high school textbook, *General Science*. This curriculum and textbook encouraged students to practice scientific thinking through problem-solving activities, a direct byproduct of John Dewey's educational philosophy. Dewey suggested that the process of science be understood and practiced by applying it to daily life situations, connecting students' everyday thinking and scientists' scientific methods from a psychological perspective (Dewey, 1910a, 1910b). Growing communities of science educators adopted this idea by employing empirical and utilitarian materials and tasks related to students' daily lives, such as the study of water pressure and pumps, air convection and ventilation, and germs and dust in the home.⁴

⁴ For more on the influence of Dewey's ideas on the general science movement in the early twentieth century USA, see Rudolph (2005).

Unlike in the USA, where educational reform was largely accomplished from the bottom-up through the influence of activists in local boards of education, progressive reform in Japan was largely driven by the MOE. Despite the lack of a strong progressive educational reform movement, a few influential educators in the country promoted the ideals of learning by doing and project methods in scientific learning. They agreed that new educational methods were urgently needed to produce students with a strong sense of scientific and civic mentality (Isozaki, 2016; Itakura, 1968; Kanbe, 1931; Wada, 1923).

However, despite the efforts of progressive educators, the government’s support for new scientific methods went into decline as the 1930s proceeded. Science education began to receive less interest from the government, as the promotion of ‘Japanese spirit’ in education was seen to be much more important at the time of the outbreak of the Manchurian Incident in 1931 and later in the Sino-Japanese War in 1937.⁵ To strengthen nationalistic ideology in public education, the MOE established research institutes such as the Institution of Japanese Culture and Spirit in 1932 and the Japanese Culture Association in 1934. Their lectures and publications primarily targeted public school teachers in order to encourage them to acknowledge the ‘Japanese spirit’, and condemn Western ideologies such as liberalism, socialism, and Marxism (Kawamura, 2011; Okamoto, 2018). In this campaign, science education was commonly criticized on the grounds that “science is very far away from the training or cultivation of the Japanese spirit” (Ōshima, 1937, p. 2). This was due to the common perception that science was inextricably tied to materialistic concerns, because scientific content solely dealt with physical factors while neglecting mental aspects (Ōshima, 1937). The MOE officials and educators similarly expressed concern that scientific teaching concentrated only on physical matters, failing to foster spiritual and moral development.

Shiono’s two textbook revisions were situated within these educational movements: the progressive educational movement and the movement promoting the ‘Japanese spirit’. Shiono directed two textbook revisions in the 1930s and 1940s: one of mathematics textbooks for elementary schools (1935–1940), and the other of science and mathematics curricula and textbooks for both elementary and secondary schools (1941–1945). Shiono’s textbooks were the first textbooks published by the MOE to contain progressive educational methods. However, Shiono had a different purpose in mind, one that deviated from traditional Deweyan thought while promoting student-centered activities.⁶ The following passage from 1936 criticizes the progressive educational movement while contrasting it with his newly proposed conception of mathematical thinking.

There are those who insist that education should be based on concrete real-life experiences and that it should focus solely on teaching the facts. However, because such approaches run the risk of falling into revue-style education, I believe that teaching should focus instead on cultivating mathematical thinking and providing methods of processing various kinds of phenomena. This is why the development of mathematical thought and quantitative approaches to everyday matters are so important. (Shiono, 1936, p. 6)

⁵ The promotion of ‘Japanese spirit’ was a political, social, and educational movement elevating nationalistic sentiment that began after the outbreak of the Manchurian incident and accelerated under the state of total war that lasted until 1945. Yamada (2014) provides an overview of educational reforms during the period.

⁶ Shiono extended the concept of mathematical thinking in his second textbook revision by suggesting scientific thinking for scientific learning. Despite the difference in subject, it is worth comparing Shiono’s usage of the concept of mathematical thinking to that of progressive educators. Both, like Dewey’s scientific thinking, emphasize methods of thinking above comprehension of knowledge.

Here, Shiono attacked the progressive educational movement for its overemphasis on facts or real-life experiences, describing it as “revue-style education.”⁷ He borrowed this term from an essay written in 1934 by Torahiko Terada (1878–1935), who was a physicist, author, and Shiono’s respected mentor at Tokyo Imperial University (known today as the University of Tokyo). Terada pointed out that current educational practices failed to grasp the fundamental principles of science and were inadequate for instilling scientific values among students, stating that they depended on excessive amounts of information and illustrations of scientific apparatus (Terada, 1934/1997). Terada’s criticism of progressive education reflected wider concerns about science teaching, which was accused of concentrating only on physical matters and neglecting mental development (Shiono, 1935/1982).

Instead, Shiono introduced the new educational aim of developing mathematical thinking in everyday situations. He once again borrowed from Terada, taking this idea. Terada promoted a unique concept of physics that focused on physical phenomena in daily life, such as the ‘horns’ dispersed unevenly on Japanese sphere-shaped sweets and lines of cracks in clay that spontaneously emerged after dehydration. He believed that scientists could derive universal scientific principles from ordinary life situations, which would lead to new scientific discoveries. His understanding of scientific discovery influenced Shiono’s idea of mathematical thinking (Oku, 1994). In Shiono’s new textbooks (1935–1940), he borrowed Terada’s approach by encouraging students to learn mathematical concepts based on real-life situations and then to put them into practice. Although Terada himself had little influence among Japanese educators, Shiono was able to translate many of his ideas and apply them practically to reforming Japanese education.

Shiono’s ideas about mathematical thinking were developed in tandem with the promotion of ‘Japanese spirit’ in the 1940s. The apparent contradiction between the ‘Japanese spirit’ and science education was reconciled by Hashida Kunihiro (1882–1945), a physiologist, a professor of medicine, a researcher at the aforementioned MOE research institutes, and subsequently the Minister of Education from 1940 to 1944. Hashida considered scientific research to be a human activity and therefore argued that cultural and social values, along with behavioral patterns, directly shaped scientific practice. His view was very much based on cultural determinism; he argued that Japanese scientists were beholden to what he labeled as ‘Japanese ways of thinking’ in their approach to science (Hashida, 1939, 1940; Okamoto, 2018). Hashida questioned the existing scientific scholarship on the basis of this assumption, arguing that it derived from Western ways of thinking, which were believed to be in serious crisis, and therefore urged Japanese scientists to use indigenous ‘Japanese ways of thinking’ in scientific research in order to stimulate scientific innovation.⁸ Therefore, he asserted that the science and mathematics curricula should be revised at all levels of public education in order to foster ‘Japanese’ approaches to science and ensure future generations’ scientific success (Kyōiku Shingikai, 1970, pp. 101–106).

⁷ The term “revue-style education” was borrowed from Terada’s essay entitled “Marcus Show and Revue Style Education.” A revue is a kind of popular theatrical entertainment that involves music, dance, and sketches but does not have an overarching narrative. In this essay, Terada made a critical argument about school education by drawing an analogy with a revue performance.

⁸ Hashida’s advocacy of Japanese thought processes resonated with skepticism towards Western civilization. In this way, Hashida questioned the legitimacy of Western thought that posited the separation of subject and object, in the same way that wartime Japanese intellectuals questioned the constraints of materialism and utilitarianism in Western civilization. For the link between Hashida and wartime intellectuals, see Kanamori (2004).

Shiono, an executive director of the revision committee for science and mathematics textbooks, related his educational theory to Hashida’s ideas. Shiono’s essays from the 1940s demonstrate his unwavering endorsement of this idea:

Even the most enthusiastic mothers teach their children laws of nature that were borrowed from the West, such as Newton’s law of gravity that explains why water flows from high to low. However, such laws are often imposed on our children, giving them the impression that they have fully grasped the wonders of the universe without pursuing the matter any further on their own. In reality, prescribed laws of nature are merely one of the approaches that we use to interpret the natural phenomenon and are always subject to change. Therefore, we have no choice but to approach the natural phenomenon but through ourselves, founded on a universal, unwavering truth that is the Japanese nation [*Kokutai*]. (Shiono, 1942, pp. 68–69)

Shiono shared Hashida’s view that the natural science learned from Western nations was useless, and a distinctive ‘Japanese science’ should be developed. In the past, when students observed objects falling, they referred to Newton’s laws because these were the principles teachers had instilled in students. Shiono, on the other hand, wanted students to avoid a superficial understanding of Western scientific laws, and instead to discover the embodiment of scientific laws that directly aligned with supposedly unique ‘Japanese’ ways of processing complex principles. In this process, the national spirit was the only principle that Japanese people should follow.

Shiono defined scientific and mathematical thinking as “the spirit of rationality and creativity,” which was believed to be the foundation of the Japanese Emperor’s divine authority and indigenous ‘Japanese’ ways of doing science (Shiono, 1940; Shiono, 1941, p. 106).⁹ Specifically, he implemented comprehensive and intuitive thinking in science and mathematics learning as new educational methods based on the national spirit, which was contrasted to the Western style of education on these topics. It was believed that previous educational approaches had only focused on analytical and logical thinking, which were considered to have originated in Western countries, and that the Japanese gift for comprehensive and intuitive thinking should be emphasized. One of the examples for this purpose was traditional Japanese mathematics (*wasan*), which was developed in the Edo period (1604–1867) and incorporated into Western mathematics in the subsequent modernization process. The development of *wasan* supported belief in the efficacy of ‘Japanese ways of thinking’ in promoting originality, creativity, and innovation with regard to science and mathematics (Shiono & Iyanaga 1943). Shiono’s mathematics textbooks included new types of activities to stimulate intuitive and comprehensive thinking, which partly originated from *wasan* (Oku, 1994, pp. 146–168). For example, the *mamakodate* problem is a math game played with *Go* stones that is a more complicated version of the Josephus problem, and *tsurukame-zan* is a method of calculation to figure out how many cranes and tortoises there are based on how many legs they have altogether.

This second revision thus aimed to replace what were seen as ‘Western’ thought processes with ‘Japanese ways of thinking’ in scientific learning. This ideology was implemented in new textbooks that were adopted in 1941 and 1943. The new series of science textbooks for secondary schools, *Busshō*, omitted references to many of the established

⁹ The concept of ‘Japanese’ ways of doing science was derived from Hashida’s idea of ‘Japanese’ ways of thinking. Shiono interpreted this concept as a specific educational objective, such as enhancing comprehensive and intuitive thinking, while Hashida defined it philosophically as the interaction of the subject and the object.

scientific laws and concepts as well as their progenitors, owing to their Western origins. For example, the textbooks introduced the term *San Heihō no Teiri* ('Three-Square Theorem') in place of the Pythagorean theorem. They also substituted different letters of the Roman alphabet to avoid the use of Western scientific symbols. For example, the symbol 'R', representing resistance to the flow of an electric current, was replaced by 'T', taking the first letter of the romanized Japanese word, *teikō* (resistance) (Fig. 1). Most importantly, instead of adopting scientific laws or theorems that originated in Western nations, *Busshō* encouraged students to induce general laws by observing particular natural phenomena. This is why the textbooks provided abundant examples of such phenomena in every chapter but did not mention the scientific principles tied to them, even leaving blank spaces with the expectation that students would fill in the general laws on their own (Fig. 1). To encourage students to discover such scientific principles, the textbooks' educational exercises were categorized into three stages—observation, contemplation, and manipulation—and were deliberately intended to make students practice 'Japanese' ways of doing science by respectively representing Japanese ways of seeing, thinking, and handling objects¹⁰: first, initiating the observation of phenomena (in this case, a series circuit labeled as "Problemization" in Fig. 1), then answering questions about the phenomena (in this case, the exact amount of current flowing through a certain component of the circuit, labeled as "Contemplation" in Fig. 1), and finally selectively introducing hands-on experiments to answer such questions and induce the principles governing the phenomena (Nihon Hōsō Kyōkai, 1942, pp. 1–49 ; Chūtō Gakkō Kyōkasho, 1943b).

Busshō, a new secondary school subject referring to the science of inanimate nature, was newly coined and organized to cultivate Japanese ways of thinking. The contents and activities of this subject were organized to make students observe phenomena and then induce governing principles without using predetermined definitions, descriptions, or explanations. *Busshō*'s unique five-year curriculum begins with the practice of elementary scientific methods for the first year and continues with scientific technique and experiments, moving to logical thinking about physical and chemical phenomena for the second year. The remaining three years focus on deliberating on and discovering scientific principles that govern natural phenomena (Nihon Hōsō Kyōkai, 1942, pp.151–183). Shiono and the other committee members described *Busshō* as "abandoning the idea that school education is to teach ready-made disciplines like natural science", such as physics, chemistry, mineralogy, and geology (Hashimoto. et al., 1943, p. 81). The content and practices of wartime textbooks were organized to make students observe phenomena and then induce governing principles without using predetermined definitions, descriptions, or explanations derived from Western science.¹¹

The wartime textbooks featured a large number of experiments and observations intended to encourage students to discover scientific concepts on their own, and the so-called learning-by-doing methods attempted to practice Japanese approaches to reasoning,

¹⁰ Japanese ways of seeing, thinking, and handling objects, which are derived from Japanese ways of doing science, refer to a specific series of educational activities in textbooks, such as "Problemization", "Contemplation", "Experimentation", invented by Shiono and the other revision committee members.

¹¹ These textbooks may not be used or taught in the way that the author intended. One reviewer provided me with an image of handwriting on one textbook, which shows that students (or teachers) used 'R' for resistance and other western terminologies. Future research is needed to examine how these textbooks were used and taught in actual educational settings, as well as the implications of a gap between ideals and practice. I thank the reviewer for sharing such valuable materials.

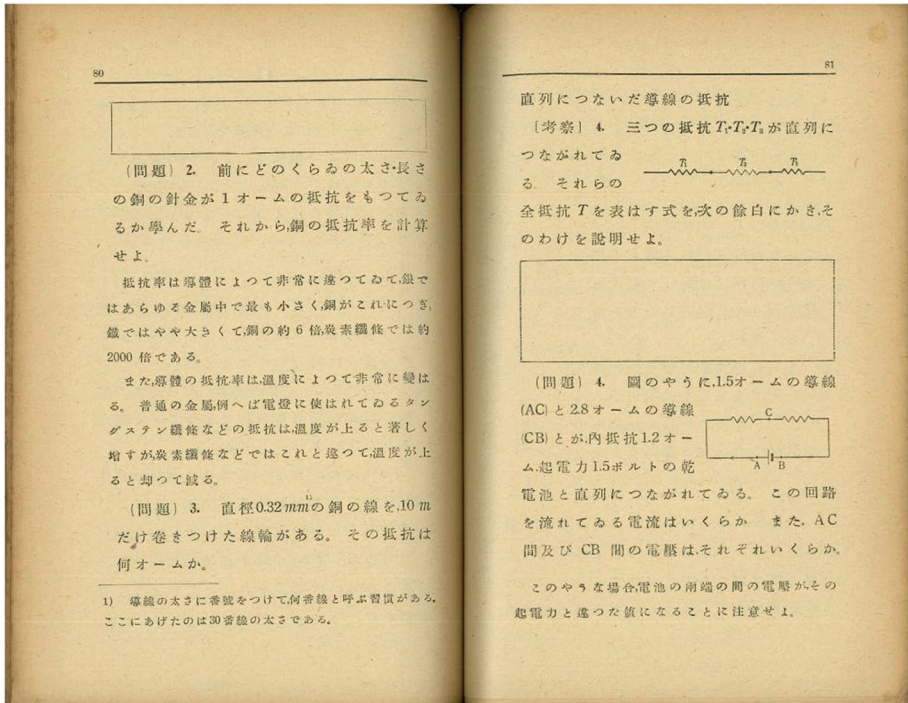


Fig. 1 Busshō for the third year of secondary school (Chūtō Gakkō Kyōkasho Kabushiki Gaisha, 1943a, pp. 80–81)

instead of relying on established theories from Western countries.¹² Shiono used these educational methods in his textbooks under the influence of the progressive education movement in pre-war Japan, although he did not agree with its educational goals; instead, Shiono implemented the ideas of Terada and Hashida in his pre-war and wartime textbooks. Both Terada and Shiono were scientists who had contemplated how the Japanese could make scientific achievements as Westerners had done. Terada devised the idea of scientific discovery in the situations of daily life, and Hashida promoted 'Japanese' ways of doing science, with the expectation that students would practice scientific methods and be prepared to become competent Japanese scientists. The problems of daily life were an indispensable tool for avoiding Western-style interpretations of nature and implementing 'Japanese ways of thinking.' Only through natural phenomena could students develop the ability to see, think, and handle objects, which was perceived as being embedded in the spirit of the Japanese people without reference to Western ways of thinking (Shiono, 1941). In this sense, Shiono's textbooks in the 1930s and 1940s were motivated by the nationalist

¹² 'Japanese' approaches to reasoning refer to Hashida's concept of 'Japanese' ways of thinking, which intended to identify indigenous mental approaches in scientific research, as opposed to 'Western' approaches to science.

desire to build indigenous Japanese scientific achievements rather than being influenced by Dewey's psychological observation of everyday thinking and scientific method.¹³

The influence of wartime promotion of 'Japanese spirit' on Shiono's textbooks has not been fully acknowledged in previous historical accounts. Shiono's pre-war and wartime textbooks have been praised in many of the post-war historical narratives of wartime science education for their experimental approach, which included direct observation and experimentation by students. This interpretation neglects the political role and importance of these educational practices in promoting 'Japanese' ways of thinking or indigenous ways of doing science. The following two sections discuss how Shiono and other educators understood and recalled their pre-war and wartime educational approaches.

3 Relocating Wartime Educational Practices in the Post-war Era

Following Japan's defeat on August 14, 1945, the country was forced to embrace democratic ideas, and its approach to education incorporated progressive educational ideals.¹⁴ Public education was placed under the control of the Supreme Commander for the Allied Powers (SCAP), the US-based office of the occupation. Aiming to demilitarize and democratize education, occupational authorities established the Education Division in the Civil Information and Education Section (CIE) on October 2, 1945, and initiated the establishment of a new educational system with the cooperation of Japanese officers in the MOE in the following year (Nihon Kagakushi Gakkai 1965; Itakura, 1968). The CIE officer Vivian Edmiston Todd (1912–1982), who directed the creation of the new curriculum and textbooks, was a strong advocate of progressive education¹⁵. Following her directions, the MOE officers referred to *The Basic Science Education Series* written by Bertha Morris Parker (1890–1980), a teacher in the Laboratory Schools at the University of Chicago, when authoring Japanese elementary and secondary-school textbooks (Parker, 1941–46; Shiba, 2006). These textbooks had thematic subtitles such as *How does Air Work?* and *What Foods Should We Eat?*, which were modeled after popular American children's science books. The post-war textbooks encouraged students to engage in problem-solving activities to practice the scientific method, which was increasingly promoted by American progressive educators in line with Dewey's educational thought (Shiba, 2006, 2016).

While the CIE implemented progressivism in post-war public education, Shiono was purged for wartime collaboration activities. He was the sole mathematics educator to be removed from a civil-service education position for having a hand in promoting ultranationalism and militarism in wartime Japan (Ueda, 1951, p. 244). His writings in the 1940s

¹³ It is important to note that Shiono's employment of student-led activities in nationalistic propaganda may not have been intended by Dewey's own philosophy. Dewey's democratic ideals were founded on an individual's rational values and communal efforts to face problematic situations for social progress (Dewey 1937/1987).

¹⁴ In a strict sense, post-war progressive education is not identical to pre-war progressive education. While pre-war progressive thought was influenced by several thinkers, post-war progressive education relied almost exclusively on Dewey's thought. Rather than identifying such differences, this paper focuses on post-war educators' understanding of the two progressive movements as well as their arguments about wartime educational practices in relation to progressive thoughts.

¹⁵ She previously worked as a research assistant and obtained her PhD at Chicago University. Her educational ideals focused on enhancing students' interest and motivation in learning by engaging them in daily life problems. For more on her background and responsibilities at CIE, see Shiba (2006), 23–46.

(Shiono, 1940, 1944) were submitted as evidence to justify his removal from public office (Shiono, 1953b; Oku, 1994, pp. 290–293). In these writings, Shiono strongly argued for indigenous ways of thinking, which he claimed to be directly inherited from the Emperor’s divine authority, and promoted their application in the Pacific War to compete against Western scientism.¹⁶ After his eventual release and reinstatement in 1951, Shiono actively participated in the criticism of American-style progressive education. In the assertions he published after 1952, he reevaluated the wartime curriculum and textbooks by comparing them with progressive educational thought. A recollective essay published in 1953 shows how Shiono conceived the two different progressive pedagogical movements of the pre- and post-war eras and relocated the wartime curriculum and textbooks in a post-war context.

Among circles of progressive educators at the time, so-called “teaching with daily life experiences” approaches have been the dominant interest at the time (*which is not much different from today*). The question that I have deeply contemplated was whether we should continue to follow this prevalent trend as it is. In this manner, I developed my own views on life, the nation, and the world, and identified “the development of mathematical thought in children and mathematical training in everyday life” as my primary objective. The problems of today’s life and teaching material units (mathematical units) seem to me to be problems that *were solved more than 20 years ago* (Shiono, 1953a, p. 30, my emphasis).

This commentary shows how Shiono observed qualitative similarities between the 1930s and 1950s in terms of the popularity of the progressive educational movement. He asserted that the wartime curriculum had already resolved the limitations of progressive education in the 1930s by adopting a new educational goal, referred to at the time as ‘mathematical’ or ‘scientific’ thinking. He was confident that he would be able to overcome what he believed to be the shortcomings of the American style curriculum and textbooks of the 1950s.

This post-war criticism of progressive education was identical to his pre-war critique. Shiono had been opposed to progressive education’s teaching method, valuing abstract thinking in mathematics education over learning tangible facts when writing his 1930s textbooks. Similarly, in his 1950s essays, he identified the most significant flaw of American-style progressive education as an overemphasis on daily life experiences rather than the use of mathematical thinking (Shiono, 1953b). Shiono insisted that American-style progressive textbooks were organized into daily life topics, with the expectation that students would learn mathematical concepts and skills through daily life activities, thus failing to make students grasp mathematical concepts and skills that were not relevant to their daily lives. For example, chapters with titles, “Mountain Climbing,” “Field Trips,” and “Medical Examination” included limited mathematical practices, such as converting meters into centimeters (or kilograms into grams) in a medical examination and multiplying two-digit numbers when collecting ‘zoo entrance fees’ from classmates in a field trip (Monbushō, 1949). To remedy the problems caused by progressive educational ideas, Shiono promoted his previous textbooks as an alternative, citing his prior experience with them in the 1930s. Shiono cited the wartime curriculum as the finest example of coherent teaching, arguing

¹⁶ According to a government report dated January 4th, 1947, after screening 8,920 national officials and others, 1,067 were removed or dismissed from office, including just 78 current (or previous) officials in the Ministry of Education. The majority of them were removed or dismissed because they had previously served in the military, had been members of ultra-nationalistic societies, or had served as administrators of occupied territories (Supreme Commander for the Allied Powers, 1990/1996). Shiono was dismissed for another reason, as the curricula and textbooks revision director for science and mathematics in the MOE, Shiono vigorously advocated the Emperor’s authority and Japanese spirit in educational activities.

that lessons should focus on developing abstract thinking rather than distracting students with particular facts. This idea in turn extended to science and mathematics education for elementary and secondary schools (Shiono, 1952, 1954).

It should be noted that Shiono attempted to locate his pre-war and wartime textbooks in the current of progressive educational thought, despite criticizing progressive education in the post-war era. His stance towards the progressive educational movement in the essays he published in the 1930s was different from those he published in the 1950s. Shiono, in his post-war essays, explicitly linked his 1930s and 1940s textbooks to the pre-war progressive educational movement, which contrasts with his previous endeavors to distance his textbooks from the pre-war progressive movement in the 1930s. In his first description of educational history in 1947, *Mathematics Education Theory*, he argued that the progressive movement in education had carried over into 1930s mathematics textbooks, and that this had continued in 1940s textbooks; he stated that “there were no essential changes” from the 1930s textbooks in the wartime textbooks (Shiono, 1947, p. 63). Furthermore, by aligning his two textbooks with progressive education in his 1953 essay, he emphasized that his textbooks were “the result of the consensus of the Japanese elementary mathematics education community” (Shiono, 1953b, p. 3). However, his post-war commentary on pre-war and wartime education was factually inaccurate and contradicted his pre-war explanations in his two textbook revisions. Before the war, he did not accept the 1920s progressive movement as it was and rejected being associated with its topic-oriented teaching methods.

Another discrepancy in Shiono’s commentary on wartime education was his attitude towards Hashida’s idea of ‘Japanese ways of thinking’. Not only did he avoid mentioning Hashida, but he also distorted the concept of ‘Japanese ways of thinking’ by expanding it to the universal domain. In a 1953 essay, Shiono asserted that wartime promotion of ‘Japanese spirit’ and the consequent educational reform had universal appeal (Shiono, 1953c). Even while stating that the concept of ‘Japanese ways of thinking’ aimed exclusively at cultivating good and loyal Japanese people, he asserted that such ideals were universally shared and applicable, “understood at all times and in all places” (Shiono, 1953c, p. 19). During wartime, scientific and mathematical thinking had been promoted as part of the mental abilities bestowed by the divine authority of the Japanese Emperor. On the other hand, Shiono replaced the Emperor’s authority with the “will of the universe” by defining the wartime ideology as “the development of all life in the world seeking harmony, not confrontation” (Shiono, 1959, p. 34). By connecting his wartime curriculum to this universal value, he could assert the similarity in educational methods between wartime textbooks and post-war American-style textbooks. According to him, post-war textbooks, which emphasized real-life experience with vivid illustrations and an accessible literary style, were very similar to wartime textbooks, which involved a multitude of student observations, experiments, and manipulations (Shiono, 1959).

Shiono’s post-war comments on pre-war and wartime education obscured the political implications of his textbooks, which were critical in the attempt to instill ‘Japanese spirit’. His textbooks of the 1930s and 1940s were written in response to the demand for the promotion of a ‘Japanese’ mentality before the war. In his first textbook revision in the 1930s, he devised the new educational aim of developing mathematical thinking to support the nationalistic movement of cultivating ‘Japanese spirit’. In his second textbook revision during wartime, Shiono aimed to cultivate ‘Japanese ways of thinking’ in scientific learning and to supplant Western styles of scientific learning. By complying with the period’s dominant ideology of ‘Japanese spirit’, Shiono promoted scientific and mathematical thinking as mental abilities bestowed by the divine authority of the Emperor. Some might interpret these discrepancies in Shiono’s writing as a by-product of his attempt to ideologically align

his writing with wartime censorship; claiming, for example, that Shiono may have superficially supported Japanese wartime ideology while still pursuing progressive educational ideas. Shiono, however, was more influenced or motivated by both Terada and Hashida, as previously discussed. When revising textbooks in the 1930s and 1940s, Shiono developed his educational idea that students should discover principles from natural phenomena and apply those principles to other situations. The ideas came partly from Terada's scientific research on everyday life and, at the same time, partly from Hashida's nationalistic promotion of 'Japanese ways of thinking' in public education. Shiono's ideas, which he gradually formed in the 1930s and 1940s, served as the central principle of his post-war educational campaign.

We cannot miss here that the main goal of his wartime textbooks was to supersede Western ways of thinking and foster a more 'Japanese' mentality among both Japanese and colonial subjects in order to secure the survival of the Empire. Since the 1930s, the MOE had promoted 'Japanese spirit' in public school education, believing that Western ideologies destroyed indigenous Japanese ethics. Furthermore, Hashida, the wartime minister of education, promoted 'Japanese ways of thinking' as a new slogan to replace the Western mentality in scientific learning. In wartime educational reform, 'Japanese' approaches to science were an indispensable means of enhancing scientific creativity and, in turn, developing scientific and technological standards. This wartime educational reform in 1943 was enacted not only in mainland Japan but also in Japanese imperial colonies, such as Manchuria, Taiwan, and Korea, which collectively belonged to the Greater East Asia Co-Prosperty Sphere (Korean Education Ordinance, 1943; Taiwan Education Ordinance, 1943). This was the first time that the same curricula and textbooks were applied to Japanese Imperial subjects after four decades of the colonization of East Asian nations. By imposing the same mandatory curricula and textbooks, the goal of cultivating 'Japanese ways of thinking' was thus adapted to local students in colonized lands. The students studied a curriculum and textbooks that were specifically designed to cultivate the Japanese national spirit. The introduction of 'Japanese' styles of scientific practices in the wartime curriculum reform was therefore intended to strengthen the unity of the Japanese Empire. In that sense, the curriculum and textbooks were instrumental or integral to the prosperity of the Empire.¹⁷

After Japan's defeat in the war, Shiono re-encountered the progressive educational movement and attempted to relocate his two textbook revisions in the current of the progressive educational movement, which had existed since the 1920s. Shiono's post-war writings definitely demonstrated a different perspective regarding the pre-war educational movement. In the post-war era, he attempted to connect his pre-war and wartime textbooks to the pre-war progressive movement, from which he had distanced himself in his pre-war writings. Furthermore, Shiono distorted the concept of 'Japanese spirit' by imbuing it with universal value. However, the wartime promotion of 'Japanese spirit' was cliquish and exclusive rather than humanistic and universal. How was he able to distort the meaning of 'Japanese spirit' in the post-war era? This issue must be examined by comparing Shiono's views to those of other educators of the period. The next section will contextualize

¹⁷ Prior to the Japanese colonies' educational reform in 1943, each colony had its own curriculum and textbooks issued by the Japanese Government-Generals of Korea, Manchuria, and Taiwan. After 1943, the colonies were taught the same subjects as Japan, including *Risūka* (*Science-Mathematics*) in elementary schools and *Busshō* in secondary schools, all with the purpose of cultivating Japanese ways of thinking. For Manchurian educational reform, see Hall (2003).

Shiono's reversion campaign and examine his assertions by comparing and contrasting them with the opinions of post-war educators and scientists, who were both directly and indirectly involved in post-war educational reform.

4 The Reception and Legacy of the Reversion Campaign in Post-war Education

Shiono's reversion campaign was exceptional in that scientists and educators who participated in the wartime promotion of 'Japanese spirit' preferred to remain discreet about their collaboration activities. After the Second World War and the subsequent US military occupation, the wartime science promotion was considered unscientific and irrational. By identifying science as the method to build a democratic and peaceful nation, politicians and intellectuals promoted scientific attitudes in research and educational settings. In this 'new' promotion of science, 'Japanese spirit' in research or education was negated and rarely discussed. Amid post-war hostility against the wartime legacy, only a few mentioned the wartime promotion of the 'Japanese spirit', and even fewer dwelled on it. Tamamushi Bunichi (1898–1982), who contributed to the revision of the wartime textbook *Bussshō*, and wrote several discussion essays on post-war scientific and educational reform, commented that he was simply compelled to write the textbook regardless of whether he agreed or disagreed with the idea of 'Japanese spirit' (Tamamushi, 1949). During the occupation, only two articles in *Shizen* ('Nature'), a leading science journal originating in 1940s Japan, dealt with the wartime promotion of 'Japanese science', and both articles dismissed the possibility of an indigenous Japanese mentality in scientific research (Nakaya, 1946; Oka, 1946).

In such a context, Shiono was able to insist on a return to the wartime curriculum due to the extraordinary status of mathematics and science education in the post-war era, at least in his contemporaries' eyes. Unlike educators working in subjects such as social studies or history, mathematics and science teachers seemed not to concentrate on how to overcome wartime educational practices in the post-war years (Ueda, 1951). Social studies and history were transformed for the purpose of cultivating democratic citizens. Mathematics and science subjects, on the other hand, seemed to retain the wartime educational legacy of curricula and textbooks without undergoing the "revolutionary reformation" seen in the humanities (Ueda, 1951, p. 243). Wartime educational ideals, in particular those emphasizing students' direct observation and experiments, seemed to be superficially linked to the ideals of student-friendly education promoted by post-war progressivism. This alleged link between wartime education and progressivism was assisted by the MOE officials' belief that wartime science education was as advanced as American-style progressive education. Like the rest of the bureaucracy, officials in the MOE survived the Occupation, and the educational bureaucracy of the wartime period remained largely intact. Most MOE officials who established the American-style curriculum of science and mathematics under the supervision of American officials were formerly engaged in committees establishing the wartime curriculum and textbooks of science and mathematics directed by Shiono. Oka Genjiro (1901–1984), Nagata Yoshio (1909–1992), and Sugai Junichi (1903–1982), members of the editorial committee responsible for wartime secondary science textbooks and post-war American-style science textbooks from 1947 to 1950, insisted that post-war American-style science textbooks maintained the approach established by the wartime curriculum and textbook revision (Oka, 1957; Sugai, 1959; Itakura, 1968, pp. 383–417).

Shiono also leveraged a reactionary movement against the US-led reformation to fuel his reversion campaign once the occupation ended. It was 1953, one year after the eight-year occupation ended, when he declared that the wartime curriculum had been superior to the American-style curriculum of the occupation era, and therefore, the old American-style curriculum should be replaced with the wartime curriculum in the future revision. The enormous influence of American progressive education in the occupation era declined after the occupation regime ended in 1952. While the MOE continued to support the progressive ideas in the science curriculum revision in 1952, educators in public schools started to rethink the value of progressive educational thought and showed subtle shifts in attitude towards it. In various social sectors, there was a movement to review and reexamine occupation period policies, with the goal of revising or abolishing them. American educational thought was seen as associated with the occupation regime (Nakayama et al., 1995). This reactionary movement invoked the concern and criticism of progressive educational thought. A disappointing result of over-education surveys conducted by the National Institute of Education and the Japan Teacher’s Union in 1951 and 1952 accelerated the criticism of the heavy reliance on progressive education (Tanaka, 1955; Tōyama, 1955).

A new educational reform was implemented in 1958 in response to a drive to disengage from American-style progressive education, which stressed student experience and problem-solving activities. The new curriculum adopted a discipline-centered approach that emphasized curriculum materials as structured bodies of knowledge, understanding, and skills, intending to raise students’ intellectual level (Masuda, 1970). Shiono’s reversion campaign was considered a part of the anti-Deweyan alliance for reform, as he vigorously connected abstract thinking to the discipline-centered approach and promoted the wartime curriculum as a viable alternative. Newly established teachers’ associations of mathematics and science participated in anti-Deweyan reform by reevaluating pre-war and wartime education prior to the introduction of the American-style curriculum, on the one hand, and by critically examining the educational effect of Dewey’s problem-solving activity with daily life contents, on the other (Tanaka, 1955; Tōyama, 1955). Shiono, a pioneer of mathematics education, seems to have had enough clout in the field of mathematics education to propose post-occupational education reforms.¹⁸ He enthusiastically advocated a return to his pre-war and wartime textbooks in the post-war inaugural issue of an elementary mathematics education journal (Shiono, 1952). Shiono evaluated the new curriculum as a partial acceptance of his reversion campaign, with an emphasis on abstract thinking and structured knowledge while remaining in the shadow of progressive education (Shiono, 1961). Shiono’s reversion campaign was effective in the context of the post-occupational reactionary movements against the American-style curriculum and the subsequent educational reform in the 1950s.

However, not all educators were receptive to pre-war and wartime textbooks, and some were critical of Shiono’s efforts to reintroduce wartime educational practices. These educators explicitly differentiated the wartime curriculum from the post-war American-style curriculum. For example, two important opinion leaders, mathematician Toyama Hiraku (1909–1979) and science teacher Sekine Yoshio (1906–?) shared the opinion that pre-war and wartime mathematics textbooks “were essentially different from” post-war American style textbooks, even though both apparently shared educational terminology such as “real-life experience” (Tōyama, 1953, p. 32; Sekine, 1957). Here, “real-life experience” refers to

¹⁸ Shiono’s pre-war textbooks were well known among contemporary mathematics educators, regardless of their disagreements concerning wartime ideology.

problems derived from students' everyday lives along with direct observations and experiments. According to those educators at that time, the role of these everyday problems was perceived differently in the wartime and post-war curricula. The wartime curriculum prioritized scientific knowledge acquisition over real-life-oriented topics; students' daily life problems were a means to obtain scientific knowledge, not an end in themselves. However, the post-war curriculum valued problem-solving activities rather than the acquisition of knowledge. The fundamental purpose of the post-war curriculum was to improve problem-solving abilities, with knowledge acquisition serving as a secondary goal (Hashiguchi, 1950, pp. 14–23). The educators' understanding of the difference between the post-war and wartime curricula was implacably opposed to that of the MOE officials.

A few renowned educators in mathematics education went even further in rejecting Shiono's attempt to relate his pre-war and wartime textbooks to pre-war progressive education. According to Nakatani Taro (1903–1997) and Iyanaga Shokichi (1906–2006), Shiono's 1930s textbooks did not carry over from pre-war progressive educational ideas. They located Shiono's 1930s textbook in two intellectual currents: traditional Japanese mathematics (*wasan*) and "coercive spiritualism," which was seen as an element of fascism (Nakatani, 1965, p. 713).¹⁹ They had probably witnessed how Shiono adapted his textbooks to the demand for cultivation of 'Japanese spirit' in the 1930s and 1940s; *wasan* was promoted as a promising traditional Japanese thought process in mathematics and science, and school activities were organized to encourage students to practice 'Japanese ways of thinking', as portrayed in wartime textbooks (Iyanaga, 1963). Specially designed activities or *wasan*-style applied problems in wartime textbooks reminded these educators of the spiritual promotion of 'Japanese ways of thinking' during wartime. The educators' identification of Shiono's textbooks with the tradition of *wasan* and Japanese fascism would support the conclusion that Shiono's pre-war and wartime textbooks stemmed from an urgent desire to practice 'Japanese' thought processes.

Shiono's reversion campaign met more serious opposition in the field of science education. When Shiono published an article promoting reversion to the wartime curriculum, this assertion was refuted in subsequent pieces written after his article in the same issue of *Rika no Kyōiku [Science Education]*, published by a newly established teachers' association in 1954. The educator, Kaneko Magoichi (1914–1996) was concerned about Shiono's reversion movement since the wartime curriculum was based on the promotion of 'Japanese spirit'. He described it as an insular, patriotic, and nationalistic movement because it negated the universality of scientific research. Kaneko did not tolerate the presence of the 'Japanese' mentality in scientific research and its application to educational practice. He stressed the need for alertness to prevent those who were behind these wartime restoration efforts from gaining power in post-war Japan (Kaneko, 1954).

These criticisms did not seriously impact his reputation in mathematics education.²⁰ Shiono was able to insist on a return to the wartime curriculum by obscuring its political implications and focusing on the educational implications of its link to the pre-war and post-war progressive movements. Shiono linked the post-war curriculum controversy to educational methodological issues, rather than political ones, by relating his pre-war

¹⁹ For the role of 'Japanese spirit' in Japanese Fascism, see Tansman (2009). It describes how fascist ideology expanded across cultural realms, with detailed explanations of spiritual promotion in wartime Japan.

²⁰ Shiono, on the other hand, did not seem to have strong influence in the field of post-occupation science education enough to advise future revision plans, although his reversion campaign extended beyond mathematics education to encompass science education throughout elementary and secondary schools.

and wartime textbooks to progressive educational methods. In the post-war era, Shiono repeatedly attempted to reduce the scope of the discussion to “educational theory” (Shiono, 1953c, p. 21). Furthermore, in his reversion campaign, Shiono advocated pre-war and wartime textbooks as remedies to the constraints of post-war progressive education. He emphasized educational reform as an urgent task in the rebuilding of Japanese society. He believed that “the fate of Japan depends on the mathematical and scientific abilities of [our] children” to ensure future economic prosperity and national security (Shiono, 1955, p. 125). While Shiono advocated for pre-war and wartime curricula as effective educational methods for the post-war reconstruction of Japan, his educational ideas were based on Japanese thought processes, which he believed should be applied in the post-war curriculum.

Indeed, Shiono’s post-war textbooks, published by *Keirinkan* in the 1950s, reproduced many of his wartime educational ideals. Educational activities emphasized the practice of abstract thinking, the mental ability to discover mathematical theory by observing and handling objects. The same methods as those used in wartime textbooks were followed to help students discover scientific principles from structured educational materials, which carried forward the ideals present in the wartime textbooks. *Wasan*-style applied problems, which were characteristic of Shiono’s pre-war and wartime textbooks, were revived in Shiono’s textbooks in the 1950s. Not only were specific activities revived, but so were the educational methods. As shown in Fig. 2, the colored-triangle paper and cross-section paper tasks were designed to lead students to engage in the observation of right-angled triangles and the contemplation of the relationships between their three sides. This procedure was intended to lead students to induce Pythagorean theorems on their own, rather than relying on predetermined explanations. This procedure was identical to exercises in wartime mathematics textbooks, which were intended to make students practice ‘Japanese’ thought processes (Chūtō Gakkō Kyōkasho Kabushiki Gaisha, 1944, pp. 21–22).²¹ Furthermore, some newly coined terms that replaced Western scientific terms, such as the *San Heihō no Teiri* (‘Three-Square Theorem’), survived in post-war textbooks (Fig. 2).²²

Shiono’s reversion campaign, as these educators suspected, was intended to promote ‘Japanese ways of thinking’ in mathematics and science education. Although he did not urge independence from the Western mentality of scientific learning, he did believe that Japanese collective ways of thinking would be indispensable in subsequent educational reforms.

It is my contention that the focus of politics, diplomacy, economics, and education must be to clarify the basis of a common national way of thinking and feeling of the Japanese people who have shared the same climate, history, and way of life, and on the basis of this overcome the harsh fate that has been inflicted on us. If we look at the various aspects of education from this perspective, we will realize that the current education system needs to be completely reexamined. (Shiono, 1955, p. 124–125)

He believed that Japanese people exhibited common ways of thinking and feeling because they shared the same climate, history, and way of life. ‘Japanese ways of thinking’, he insisted, should be the basis for reforming not only the educational system but also the broader political, diplomatic, and economic systems in post-war Japan in order

²¹ This does not mean that his post-war textbooks were identical to pre-war and wartime textbooks; post-war textbooks adopted scientific laws or theorems, which mostly came from Western countries, and included summaries or conclusions to explain the results of observations and experiments.

²² The term of *San Heihō no Teiri* is still used as a synonym for the Pythagorean theorem in current mathematics textbooks.

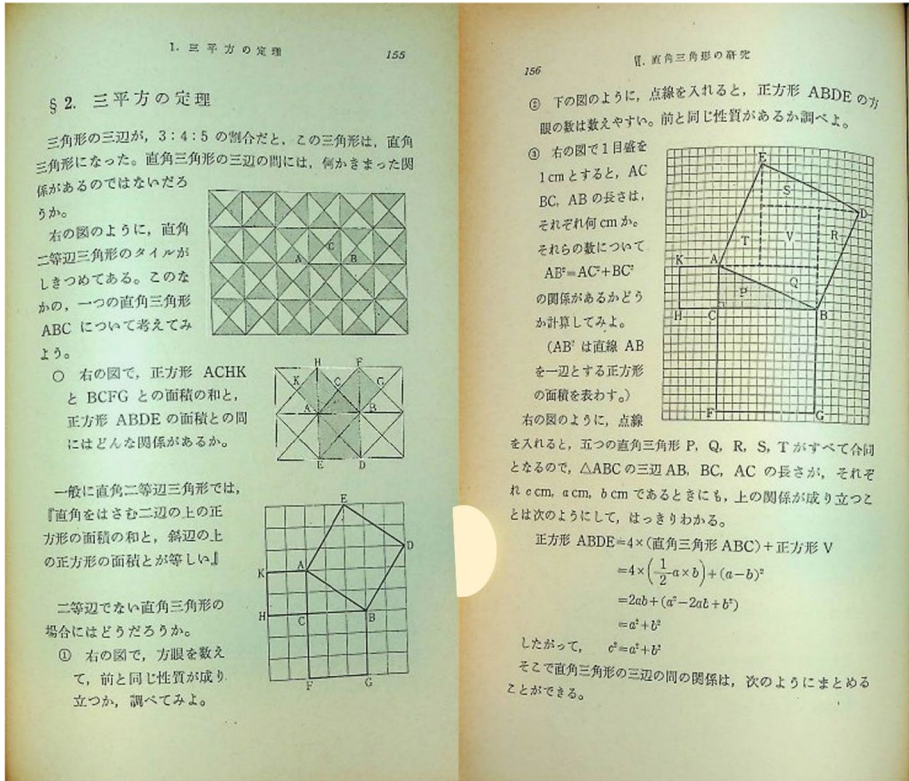


Fig. 2 A mathematics textbook aimed at third-year students in secondary school (Shōda & Shiono, 1955)

to tackle problems that stemmed from Japan’s defeat. This ‘Japanese’ style of scientific practice, which had been a part of wartime ideology, survived in his post-war educational program. Shiono’s educational ideals were consistently maintained in this way, from his wartime textbooks through his post-war campaign.

In post-war Japan, Shiono’s promotion of ‘Japanese’ approaches to reasoning was accepted as solely educational. By relating his pre-war and wartime textbooks to progressive educational methods, he linked the post-war curriculum controversy to educational issues alone, away from political ones. By limiting the scope of the discussion in this way, the political implications of wartime textbooks and the endeavor to practice ‘Japanese ways of thinking’ were erased and concealed behind the student-centered experimental and observational activities. Shiono’s attempt to locate his textbooks in the current of progressive education was successful in convincing educators that his pre-war and wartime educational practices were superior ways to learn scientific concepts and methods. Shiono positioned himself as an early proponent of the pre-war progressive education movement. His campaign appealed to educators who were dissatisfied with post-war progressive education and mostly unconcerned about science’s role in disseminating wartime ideology. He participated in the writing of post-war mathematics textbooks, and his textbooks published

by the *Keirinkan* gained popularity in many primary and secondary schools²³. His pre-war elementary mathematics textbook was evaluated as the first national textbook to make a significant leap in teaching approaches by including child-friendly activities in relation to progressive educational thought (Matsumiya, 2007). The political implications of his textbooks, how his ideas of mathematical thinking were developed in tandem with the promotion of ‘Japanese spirit’ or how these ideas supported indigenous ‘Japanese’ ways of doing science, were rarely discussed and even became invisible in the contemporary Japanese education scene.

5 Conclusion

Shiono’s post-war campaign successfully concealed the political implications of the wartime curriculum and textbooks. Wartime pedagogy was promoted as an effective educational method for post-war reconstruction in Japan, despite having originally been aimed at superseding Western scientific knowledge and cultivating ‘Japanese spirit’. Shiono’s encounter with progressive education in the 1930s convinced him of the superiority of the wartime curriculum over the progressive one. The political implications of wartime education were ignored, with the focus instead put on the understanding of the curriculum’s content. Shiono disregarded the fact that progressive educational practices, such as student-led experimentation and observations, were implemented in wartime textbooks in order to cultivate ‘Japanese spirit’. Shiono’s post-war reversion campaign did not mention the link between learning by doing and the wartime promotion of ‘Japanese spirit.’ His post-war campaign obscured the original aims of cultivating ‘Japanese spirit’, prompting most educators to overlook the political implications of wartime educational practices.

When progressivist educators introduced new educational methods such as student-led experiments and observation, they advocated for the practice of scientific thinking in solving everyday problems rather than passive learning. Shiono adapted these student-centered activities to his educational ideals of developing abstract thinking in response to the demand for the cultivation of ‘Japanese spirit’. This learning-by-doing method, originally inspired by the progressive movement, was used to support ultra-nationalistic education with the goal of cultivating ‘Japanese ways of thinking’. Shiono’s educational ideal of emphasizing the mental ability to discover principles from natural phenomena was influenced by Terada and Hashida. The strong influence of these two intellectuals was absent from Shiono’s post-war recollections and reversion campaign. Furthermore, Shiono positioned his 1930s and 1940s textbooks in the current of the progressive educational movement, despite the fact that he had distanced himself from that movement in the 1930s. It may be difficult to associate Dewey’s problem-solving activities with Japan’s ultra-nationalistic educational campaign. Shiono introduced examples of problems rooted in daily life in his 1930s mathematics textbooks and included more experiments and observations in wartime textbooks to encourage students to discover principles via such hands-on activities. These materials and activities were entirely intended to inculcate specific ways of thinking, rather than Dewey’s

²³ Shiono’s mathematics textbooks were the most widely used in elementary and secondary schools across Japan in the 1960s. The Keirinkan publishing company recruited the former textbook editorial officers, including Shiono, as textbook writers in order to increase the quality and reputation of the textbooks. However, Shiono did not work on science textbooks for Keirinkan, the same publishing company. (Sōgyō 20 nen-shi henshū iin kai and Keirinkan, 1967)

scientific reasoning. The link between educational ideals and their political functions is negotiable, as is the link between learning-by-doing and nationalistic ideology.²⁴

Shiono's argument, based on collective Japanese ways of thinking, could be seen as a form of cultural relativism.²⁵ However, it was more than just an identification of indigenous nature, society, and culture; he advocated for an educational reform in which the curriculum and textbooks should be designed to promote 'Japanese ways of thinking'. Shiono and his allies advanced this 'Japanese scientific spirit' as a panacea for the limits of declining Western styles of scientific thinking. That is, Japanese ways of practicing science were presented as the new universal. Given that this educational aim was applied to students in Japanese colonies, the idea of 'Japanese ways of thinking' was enforced as a universal principle in order to cultivate imperial subjects and supplant Western ways of doing science, which previously had imperial authority and supremacy in the practice of science.

The rediscovery of the political implications of wartime textbooks shows that science education is related to moral and political issues as well as intellectual and economic ones. The moral value of scientific learning (in terms of the mentality taught to students) has not been adequately considered in historical studies, particularly those relating to Asian countries where science and technology are closely linked to the developmental ideology of building an economically prosperous and militarily strong nation. Historians of science education in Japan have overlooked how science education served as a moral and spiritual guide in the service of the Japanese Empire and how post-war educational discourses excluded this wartime guidance in favor of a technologically and economically constrained state ideology. As this study has shown, science teaching and learning did not simply aim to cultivate competent scientists and technicians but also had a more serious ambition to cultivate imperial subjects who were motivated to locate indigenous Japanese thinking in scientific principles. The idea of 'Japanese ways of thinking' was maintained in post-war educational practices, at least in Shiono's post-war mathematics textbooks and later educational discourse. An examination of the post-war resurgence of the idea of indigenous 'Japanese ways of thinking' would reveal the moral values that were emphasized in post-war educational practices. A critical analysis of the wartime legacy of post-war science education will provide us with critical examinations of the moral and political dimensions

²⁴ Similarly, Dewey's ideas were employed to strengthen the utilitarian vision in the American educational environment, with the goal of educational usefulness and social efficiency, which differed from Dewey's original views (Tomlinson 1997; Labaree 2010). Shiono employed student-led activities to support nationalistic propaganda, while administrative progressive educators in the USA used Dewey-style activities to meet the societal need for workforce preparation. The US case is worth comparing to Japan's case since such a comparison shows, first, that Dewey's educational ideas have been put to different uses in different contexts and, second, that future research will demonstrate the transnational and interconnected histories of educational philosophies and practices. I thank one reviewer for suggesting that I compare the context of Japan and the USA.

²⁵ The idea of Japanese exceptionalism in terms of a supposedly unique approach to the natural world was frequently used to emphasize the locality and originality of Japanese science, which was believed to be distinct from Western approaches (Isozaki, 2014; Kawasaki, 1996; Ogawa, 1998; Watanabe, 1997). This study, however, does not limit itself to addressing indigenous styles of scientific practice, but rather seeks to identify its political function of inculcating nationalist ideology in scientific learning. It is worth noting that these previous studies derive the idea of the Japanese thought process from a mixture of nationalistic and scientific discourse in the 1930s; examples include Terada Torahiko's essay 'Japanese Concept of Nature' (Terada, 1935) and Watsuji Tetsuro's '*Fūdo* (Climate)' (Watsuji, 1935). Both essays argued that the people's mentalities and thought processes were shaped by Japan's unique natural environment. This assertion directly coincided with the rise of nationalism in the 1930s.

of contemporary Japanese education, which is confronted with the rise of state-sponsored authoritarianism at a level not seen since the Second World War.

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For the romanization of Japanese text, I have adopted the Revised Hepburn system. Japanese names are in their original order, with the surname first followed by the first name.

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