Vietnamese Education System and Teacher Training: Focusing on Science Education

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Abstract

This article introduces the reader to past, current, and future trends in science teacher preparation and professional development in Vietnam. The authors rely on document analysis for data collection and focused analysis to describe the general education system and the mechanisms for teacher training in Vietnam from the past to the present. Research questions focused on exploring changes in the organization of the education system over time, identifying advances that have been made, and describing what challenges teacher education faces today. In addition, this paper offers a special focus on how Vietnamese pedagogy institutions are working to prepare new teachers. Finally, the authors describe how Vietnam is preparing to implement a new national
general education program that will strongly affect all aspects of education, including training and retraining of teachers. The authors conclude by raising some important questions for future research and development.

Keywords

science education – Vietnam’s education – teacher preparation – education innovation

1 Introduction

The Vietnamese education system aims to solve three major tasks: improving the people’s knowledge, training of human resources, and nurturing talents (Law on Vietnamese education, 2005). Over the past 30 years, Vietnam has been implementing doi moi (innovation), which is a homegrown, open economic campaign that followed a period of centralized economy. Vietnamese education has played an important role in contributing to socio-economic development. Furthermore, globalization and the on-going process of Vietnam’s international integration have required extensive reforms in the education system (Congress XIII, 2014). For this reform to be a success, researchers have needed to reflect on Vietnam’s education reforms from feudal to modern times, as these experiences can suggest the way forward to make Vietnam’s education system ready for the future. A goal of this paper is understanding the role that science education plays in preparing Vietnam’s citizens to be prepared for the future, and the authors will shed light on historical developments of education in Vietnam with a focus on its system and education reforms. We will then focus on identifying and describing characteristics of both general and science teacher education in Vietnam, both in pre-service and in-service education. After providing these brief overviews, the authors will introduce Vietnam’s new general education reform strategy and will highlight aspects of science education reform that are similar and different from other educational contexts around the world.

2 A Brief History of Vietnamese General Education

Vietnam’s education system has a long history of development from feudal to modern times. At each historical stage there have been distinct developments. During feudal times, nationwide contests helped the government to select talents, and during the French colonial period, education divided learners into different age groups and organized students into individual grades from primary
to high school levels. After the revolution in August 1945, Vietnamese education has undergone many reforms. These reforms have sought to eliminate illiteracy and to unify the educational programs of the northern and southern regions according to the new Vietnamese state’s educational philosophy. In the following sections, we describe each stage of development in more detail.

2.1 Feudal Education

The Vietnamese feudal education system was organized according to the ancient Chinese model (Vu, 1985; Bui, 2019; Phan T.B., 2006), in which Confucian ideologies were incorporated into feudal temporal examination (Phan H.C., 1992). At that time, the educational system included private schools (schools owned by teachers at villages, called thầy đồ) and public schools. Private schools provided education for the masses and public schools were the schools for children of district and government officials (Bui, 2019). The highest-level school was the Quoc Tu Giam School for royal courtiers. During the Le dynasty (or Later Le dynasty, 1428–1789), attendance was expanded to include all those who passed the local exams that were necessary to be able to participate in court competitions (offered at the court level and the king level). The feudal social class was clearly reflected by the way students were addressed, with the children of the King, such as the princes, being called tôn sinh (ton sinh), children of the mandarins of the court being called am sinh (am sinh), and the children of local district/government officials being called công sinh (cong sinh).

For the Examiners of the National Examination, making sure that the most talented students passed the exam was considered the only means for creating conditions to select future government officials who would be both morally upstanding and well versed in important literature of the day (including politics, military strategy, economics, philosophy, and poetry). During that time, educators believed that the purpose of teaching writing was to train knowledgeable, creative, and talented people who would know how to behave wisely and be diplomatic (Phan H.C., 1992; Phan N.L., 2006).

The purpose of the feudal exam was to recruit talented people according to the needs of the court. The content of the study and examination required profound, deep, and wide knowledge. However, the focus was mainly on the content of feudalism that only focus on the feudal social structure itself in which the central roles of king and royalty were emphasized through regulations of ethics, manners and etiquette. The feudal state did not strictly regulate the content and learning process. Participants learned in groups, regardless of age and level. When they finished studying Confucian books, they registered automatically for the exam. The feudal examination system continued over a long time period and through many dynasties. By the Early Le Dynasty (1428–1527), exams had been divided into three levels: Huong Examination (local examination),
Hoi Examination (court examination), and Dinh Examination (king examination). The exams were organized every three years, and the last exam held in the feudal examination period was in 1918 (Phan N. L., 2006). Thereafter it was replaced by the examination of French colonial government.

2.2 General Education during the French Colonial Period

In 1884, the Giap Than agreement placed the territory of Vietnam under the “direct protection” of the French colonialists. At this time, the education and examination system in Vietnam changed from the Chinese model to the French model. In this context, French replaced Chinese in the schools. Primary, secondary, and tertiary education systems were all clearly organized. However, the French school system was only for French children and children of wealthy Vietnamese people. The Vietnamese school system, also known as the French-Vietnamese school system because of providing education for Vietnamese children only but under French curriculum and mainly in French language, was different in form from the French school system (Vu, 1985; Phan N. L., 2006). In the sections that follow, we describe the French school system as it was first established in Vietnam. We also highlight the inequalities in educational opportunity available to French and Vietnamese children and the inequalities of opportunity among Vietnamese students of different socio-economic classes. After describing these historical developments, we provide more insights into today’s education system and offer a detailed account of science teacher preparation and the K-12 science education.

2.3 French School System

In the French school system, primary school consisted of five years of instruction, middle school (also known as primary college) four years, and high school three years. After graduating from high school, French students returned to France to study in their “mother country.” By 1924, in Indochina (including Vietnam, Laos, and Cambodia), there were only three high schools, located in Hanoi, Dalat, and Saigon.

| School Name           | Lycée Albert Sarraut | Lycée Chasseloup Laubat | Petit Lycée |
|----------------------|----------------------|-------------------------|-------------|
| Location             | Hanoi                | Saigon                  | Dalat       |
| Student total        | 1,126                | 979                     | 389         |
| French students      | 725                  | 830                     | 342         |
| Vietnamese students  | 401                  | 149                     | 47          |

TABLE 1 Three high schools and number of students in the French school system (1937)
Table 1 offers a snapshot of high school location and enrollment information in 1937, which shows that roughly 75% of all students enrolled were non-Vietnamese. This table demonstrates how limited educational opportunities were at that time, which contributed to social and political unrest as more Vietnamese families sought to provide better access to schools for their children.

The curriculum mainly focused on teaching French. Besides mathematics, physics, and chemistry, the subjects of science education were also very diverse, including zoology, botany, geology, kinematics, statics, and cosmology. The curriculum of these subjects was designed to match with the high school curriculum in France, but the contents did not go deep enough. The French government did not have a systematic curriculum nor did they have specific teachers for their educational system. The subjects were heavily theoretical, lacked knowledge associated with Vietnamese practices, and also lacked training in practical skills (Bui, M., 2019; Phan, T.B., 2006).

The French-Vietnamese school system, attended by Vietnamese children only, began at Primary Level 1, where for three years students mainly learned the Vietnamese language. Students could learn French and Chinese as extra subjects. At the completion of Primary Level 1, students were awarded a preliminary elementary degree. To attend Primary Level 2, students needed to be proficient in French, as the Vietnamese language and Chinese characters were only minor subjects. Students who attended Primary Level 2 for three years and graduated could then enroll in primary college, which was the equivalent to middle school or junior high school today. Students who graduated from primary college were granted a degree and could then proceed to the French-Vietnamese lycée system, which is equivalent to high school and required three years of study. Very few Vietnamese students passed to this level, but by 1929 there were three French-Vietnamese high schools (see Table 2).

| School Name | High School for Protection | Petrus Ky High School | Quoc Hoc school |
|-------------|---------------------------|----------------------|----------------|
| Location    | Hanoi                     | Saigon               | Hue            |
| Total Number of students | 164                      | 159                  | 77             |

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https://creativecommons.org/licenses/by/4.0/
In the context of total Vietnam population in the period of 1920–1940 was about more than 10 millions people (Banens, 2000), the small number of students shown in Table 2 demonstrates a serious inequality in society, as very few Vietnamese students could access high schools. Even more seriously, during the 80 years of the French colonial period, the French colonialists opened only one university for all of Laos, Vietnam, and Cambodia. This university had only two faculties: law and medical science. The highest number of graduates was 800 in one year. This imbalance in education became one of the factors that led to social and political unrest and increased calls to action to revolt against the French colonizers.

This system remained in place until August 1945, when the Vietnamese declared independence from France. However, it was not until the French were defeated in 1954 that the modern-day Vietnamese education system began to be established. The current education system has undergone many reforms over the last 75 years. In the sections that follow, we highlight policies that have had a critical impact on general education and then we focus attention on teacher education and science education.

3 Development of General Education in Vietnam after August 1945

3.1 August 1945 Revolution until Independence in 1956

On November 25, 1945, the Party Central Committee issued the National Resistance Directive, which clearly stated the goals for “actively eliminating illiteracy, opening universities and high schools, reforming learning in a new spirit, and eliminating the teaching methods of coercion and learning by heart” (Bui, 2019, p. 108). It is clear that the Directive has made the new education system available to all people, regardless of their socio-economic class, with a goal to foster an independent country that respected human dignity and developed personal talents to the utmost to serve the country and to contribute to the general evolution of humanity. Pedagogy was seen as an important way to reach these goals, and the new education system sought specifically to promote the spirit of science in order to cultivate students with a formal awareness about the methods of scientific thinking. Special attention was paid to professional training of students to help them occupy important and necessary positions in society.

In 1945, the Ministry of Education specifically worked to eradicate illiteracy by passing three ordinances of “universal learning” (Bui, 2019), designed to create schools in all villages, communes, and towns with the goal of having
all Vietnamese people aged eight and over be able to read and write the national language within one year. One year after the decree was made, over 76,000 classes had been organized. The resulting changes have been credited with eradicating illiteracy for 2.5 million people (Bui, 2019). However, in the late 1940s and early 1950s, schools in large cities had to temporarily suspend teaching activities to evacuate to rural areas due to another period of resistance against the French. During this difficult time, the policy of expanding the network of primary schools to meet the needs of all children continued with a goal of supporting the national resistance against the French. Boarding schools, which were highly suitable for the war situation, opened in this period to attract children of evacuated families, families of soldiers who had no place to study, and ethnic minority children who lived in rural areas where schools were not yet available. Establishment of other types of schools, such as semi-public schools and private schools, was also encouraged in order to support the education of citizens by promoting literacy in Vietnamese and training for the establishment of a post-colonial society.

After stabilizing the organization of all kinds of schools, the Ministry of Education advocated for improving the content of the curriculum and teaching methods used in schools to help students fulfill their obligations as citizens of their country. This required the development and training of more teaching staff. As a response to this, the first short-term training programs for general teachers were established. The training program included knowledge of pedagogical skills and pedagogical practice. The Ministry of Education also encouraged teachers to engage in self-study and reflection. In addition, the government began to organize a system for teacher education exams and salary schedules to stabilize the national education system.

Following the August 1945 revolution, fundamental changes in the organizational system, management and structure, content, and educational methods were introduced with a goal of educating the general population for the resistance to colonial rule. However, it was pointed out by General Secretary Truong Chinh that while “the country is building a new democratic regime in the resistance, our education does not have a new democratic spirit, and the education program and teaching methods are also too imitative” (Bui, 2019, p. 137). It was reasoned that a new education system required relevant educational reasoning, so in 1950 the first major education reform was introduced with the goal of supporting a new period of resistance in all sectors, including education (Bui, 2019). The objectives of the education reform were to build education of the people, by the people, and for the people by fostering the young generation to become future working citizens loyal to the people's democratic
regime. To support this effort, during the time of resistance, the number of years of compulsory schooling was reduced to nine and included three levels: primary education (four years), secondary education (three years), and upper secondary education (two years). Compulsory education was expanded to include universal education offerings for adults that were not of traditional school age.

The universal education program offered a program of study to eliminate illiteracy through four months of primary education and offered preparatory and complementary education programs intended to supplement primary and secondary education levels up to Grade 3 (with four months of study) or Grade 5 (with eight months of study). In addition, the education system was expanded to include professional and university education. Professional training in vocational schools was available to primary school graduates for beginners with one- and two-year programs, and secondary school graduates could study for two to four years to become technical intermediate staff. Finally, a higher education system providing medical degrees and advanced pedagogy, and a public college was established for high school graduates.

Other reform initiatives involved the re-organization of how schools were managed with a new emphasis on the principle of collective leadership (professional councils, disciplinary councils, and boards of directors) and a focus on democracy (principals served as chairpersons and council members had the right to vote and discuss equally). Additionally, new curriculum and textbooks were developed at this time to focus on subjects about revolutionary culture and resistance, the revolutionary history of Vietnam, and the local geography of Vietnam. In addition, some new subjects such as policy issues and civic education were introduced. In the areas of natural science, the curriculum focused on basic knowledge and on the application of knowledge in practice. Some of the content had been cut down to fit the educational context of the war. During this period, educational guidelines contributed to linking the school with social life and with the resistance of the entire population. When students graduated, obligations as citizens of the country are fulfilled.

Initiatives focused on the training of staff and teachers in 1950 played an essential role in developing a new and critical democratic regime. Teacher education focused on developing a neutral education perspective and professional expertise, building good relationships between schools and communities and between teachers and students. In addition to training courses, in 1953, the first pedagogical schools were established to train teachers. The second major reform for education began after 1956 when Vietnam officially won independence from France.
3.2 Post-Independence until Unification: 1956–1976
During the two decades following independence from France, Vietnam underwent a long and difficult war with America and its allies. During that time, the education system underwent many important reforms. Some important changes included the establishment of final exams at the completion of Primary Level 1 and at the completion of high school. The school year was established to include 33–35 weeks of study taught over nine months with three months of summer vacation. In addition, textbooks were developed and continuously revised during this time, especially to reflect the education system model of socialist countries, mainly the Soviet Union (Pham, 1992).

Vietnamese education from 1945 to 1976 emphasized fostering a spirit of patriotism and fighting foreign forces. It stressed loving labor, a collective spirit, reasoning methods, and scientific work habits for students. Therefore, the national education program and system were streamlined, providing the most basic knowledge. Many science subjects were integrated, and the time for teaching these subjects was shortened. Due to the special circumstances, science subjects were not taught deeply and comprehensively in high schools.

3.3 Unification Education Reforms: 1976–the present
Following the end of the war, the education system played an important role in the unification of the newly completely liberated country. The Soviet education model was applied uniformly across the entire country with the goal of cultivating a cultural ideological revolution to promote economic, cultural, scientific, and technical development for the whole country. Additionally, the new education system sought to implement universal education for the whole population and to establish educational principles focused on supporting students to engage in learning coupled with practice that combined productive labor with vocational training and scientific research and experimentation. During this period, the education system was expanded to include 12 years of compulsory public education, and the government worked to develop new textbooks aligned to the overall spirit of reform.

These efforts have paid off, as can be seen by the expansion of the postgraduate education system. Since 1976, the entire education system has grown exponentially. Today the whole country shares the same basic education system and structure (Table 3).

Today the education system is growing, with more than 50% of all students enrolled in primary grades (see Figure 1).
Since 2014, there has been a steady increase in the total number of students. In 2018, there were about 16.5 million students enrolled in K-12 schools. The Vietnamese government is working hard to address the challenges associated with supporting the development of an expanding education system. In the sections that follow, we provide more details about the general education system to provide some context for a more detailed description of the science education system.

### Table 3: Current education system structure in Vietnam

| Level                  | Preschool education | Primary education | Lower secondary education | Upper secondary education | Higher education |
|------------------------|---------------------|-------------------|---------------------------|---------------------------|------------------|
| Grade                  | 1–5                 | 6–9               | 10–12                     | 18 and above              |                  |
| Age                    | 3–5                 | 6–10              | 11–14                     | 15–17                     |                  |
|                        |                     |                   |                           | Professional secondary;   |                  |
|                        |                     |                   |                           | Vocational training       |                  |
|                        |                     |                   |                           | 18–20: Colleges           |                  |
|                        |                     |                   |                           | 18–23: Universities       |                  |
|                        |                     |                   |                           | 21+: Master’s, doctorate  |                  |

![Figure 1](image_url)  

**Figure 1** Total number of students enrolled in grades K-12 from 2014–2018 (Vietnam, 2020)
4 General Education in Vietnam Today

4.1 Number of School Classes and Number of Teachers
Based on General Statistics Office of Vietnam data (Vietnam, 2020) the total number of school classes in Vietnam currently is 498,667 with 280,179 in primary (56.2%), 151,986 in lower secondary (30.5%), and 66,502 in upper secondary (13.3%).

This growth in school classes was accompanied by a growth in the number of general education teachers in Vietnam, which from 2014 to 2018 has increased to more than 800,000. The number of upper secondary teachers is around 20% of the combined number of lower secondary and primary teachers (see Figure 2), which reflects the youth of the population of Vietnam.

4.2 Class Size
Due to young population, class size in Vietnam is always quite big, especially at upper secondary schools, where on average there are 38 pupils per class (Table 4). Nevertheless, in some big cities, this number is even bigger, with 45–50 pupils in one class (Suhas D. Parandekar, 2016).

Large class sizes present many challenges for teachers and educators in terms of delivering lessons and conducting education activities. To address this issue, the government is working to prepare more teachers and is improving professional development opportunities for in-service teachers.
5 Innovations in Education in Vietnam Today

In this section, we offer some examples of the ways in which the Vietnamese government is working to improve the education system. We describe some innovations and describe the current response to these innovations.

5.1 Achievements of Current Education and the Need for Education Innovation in Vietnam

In this section, we specifically introduce some of the legislation that has contributed to expanding educational opportunity for a society. Resolution No. 29/2013-NQ/TW of the Central Committee of the Communist Party of Vietnam reviewed some achievements of Vietnamese education since innovation (doi moi):

After 30 years of renewal, general education in Vietnam has achieved major successes (...). In addition to these advances, illiteracy elimination and primary completion programs were completed in 2000 and the secondary completion program was completed in 2010. The education quality has improved to a certain degree. Both the quantity and quality of educators and administrative officers have increased with increasingly reasonable structure. Education is more accessible, especially to ethnic minorities and beneficiaries of incentive policies; gender equality in education has been basically achieved.

General Secretary, 2013

This resolution outlines efforts to improve literacy rates and expand teacher preparation and education. In addition, policies have aimed to make education more accessible, regardless of ethnicity or gender. One example is that primary education is now free for all children (in public schools) and compulsory education is required through the end of lower secondary school.

| School level      | 2014–2015 | 2015–2016 | 2016–2017 | 2017–2018 | 2018–2019 |
|-------------------|-----------|-----------|-----------|-----------|-----------|
| Primary           | 27.0      | 27.5      | 28.1      | 28.7      | 30.5      |
| Lower secondary   | 33.8      | 33.5      | 34.5      | 35.0      | 35.9      |
| Upper secondary   | 38.2      | 37.8      | 38.1      | 38.1      | 38.5      |
In addition, in 2012 Vietnam joined the Programme of International Student Assessment (PISA) organized by the Organisation for Economic Co-operation and Development (OECD). Vietnam’s PISA results have been positive for 15-year-old students (Figure 3).

Although the PISA results in 2015 were lower than in 2012, in science Vietnam’s score was higher. In general, Vietnam’s PISA scores were comparable with other developed countries. For instance, Vietnam’s score in science was not statistically different from the scores of students from Canada, Finland, Netherlands, Poland, People’s Republic of China, and Republic of Korea (Ministry of Education and Training, 2015; Organization for Economic Co-operation and Development, 2015).

However, the Central Committee’s Resolution No. 29/2013-NQ/TW also indicated many weaknesses in Vietnamese general education, including that the quality and effectiveness of education are still lower than expected. Additionally, the education system lacks continuity between levels and methods of education, is theoretical rather than practical, and uses obsolete and imprecise methods of education, testing, and assessment (General Secretary, 2013).

As the result of current situation, the Vietnamese education system needs to comprehensively reform education and training, especially “the renovation of the general education programs in the direction of developing learners’ qualities and competences” (Nguyen, 2017). According to Resolution No. 88,
reform of general education curriculum and textbooks should make radical and comprehensive changes in the quality and effectiveness of general education, combining teaching knowledge, teaching people, and orienting careers. It should contribute to the transformation of the education system from a knowledge-oriented one into comprehensive education with the aims of developing learners’ qualities and competences, harmony of mind and body, and the best potential of each student.

Congress XIII, 2014

Researchers recognize that education needs to create “a learning environment that encourages students to develop both physically and mentally in harmony” and help students to become “active and confident learners who engage in career-oriented and lifelong learning” (Nguyen, 2017). In the Fourth Industrial Revolution context, Vietnamese education faces challenges and negative effects. The Prime Minister indicated that to address these challenges, it is necessary to change the policies, content, and methods of education and vocational training in order to generate human resources that are able to follow new technological production trends, including a focus on promotion of training in science, technology, engineering, and mathematics (STEM), foreign languages, and universal information technology.

The Prime Minister, 2017

The suggestions outlined here are considered to be significant requirements for improving education. In particular, general education has been asked to promote “the teaching of science, technology, engineering, and mathematics (STEM)” in the general education curriculum. Educational objectives must pay attention to building “basic skills and knowledge, creative thinking, and adaptability to the requirements of the Fourth Industrial Revolution” (The Prime Minister, 2017). These directives have important implications for the need for the education system to continually improve and develop to meet these challenges.

6 Orientation towards Educational Innovation

Resolution No. 29/2013-NQ/TW stated that the future of Vietnamese education should be reformed “towards valuing learners’ capacities and personal qualities” (General Secretary, 2013). This resolution is indicative of Vietnam’s general orientation to innovation in education. In this section, we describe some important recent and on-going changes.
6.1 Implementing a Competency Based Education Curriculum

The current general education curriculum (GEC) was first launched in 2006. The new general education curriculum (GEC, 2018) aims to develop five main qualities and ten core competences for students. The implementation roadmap of the new GEC is described in the Figure 4.

The five main qualities are: patriotism, compassion, diligence, honesty, and responsibility. The 10 core competencies are: autonomy and self-learning, communication and collaboration, problem solving and creativity, language, calculation, science, technology, computing, aesthetics, and physique. The new GEC will be officially implemented in school year 2020–2021, starting from grade 1.

6.2 Reducing Theory and Enhancing Practice

The GEC 2018 was built to emphasize “increasing practice and application of knowledge to real life” and “focusing on social activities, extra-curricular activities, and scientific research.” The total number of subjects in the GEC 2018 is 13, which is less than the 17 subjects required by the GEC 2006 (which is still being implemented). In the GEC 2018, science subjects at the lower secondary level are to be taught as integrated subjects rather than separate science subjects (see Table 5).

In addition, the subject content does not have the structure of knowledge units, but rather topics that are close to real life. The GEC 2018 provides upper secondary students choices of subjects and learning topics, thereby reducing the number of required subjects. For more details about the curriculum for all grade levels for GEC 2018, please review Appendices 1–3.

In addition to reducing curriculum topics, renewing methods of teaching and learning are also important new orientations in the development of general education in Vietnam today. Due to the large amount of knowledge they are required to teach, teachers mainly use presentation methods to impart knowledge to students. The new GEC reduces the amount of knowledge so that teachers can use modern teaching methods, enhance practical activities, and
experience activities to build students' competency. However, teachers have difficulty in updating their teaching methods due to limitations in teaching conditions, such as large classes and lack of teaching equipment. The government is trying to improve the conditions to ensure the quality of general education in Vietnam.

6.3 Innovating Examination and Assessment in Teaching and Learning

Using the competence approach for examination and assessment is also an important measure to innovate general education in Vietnam. Assessment is measured through learning (increasing the formative assessment rather than focusing primarily on the summative assessment), involving identifying and solving, in a variety of contexts, problems that are characteristic for a specific domain of knowledge and field of activity (No. 22/2016/TG-BGDĐT, Circular, 2016). The Ministry of Education and Training issued guiding documents on student assessment (No. 30/2014/TG-BGDĐT, Circular, 2014; No. 22/2016/TG-BGDĐT, Circular, 2016) that demonstrate the application of the evaluation philosophy “assessment for learning” and “assessment as learning.” According to these documents, teachers need to focus on both formative assessment and summative assessment. In addition, students are involved in the assessment process through self-assessment and peer assessment activities. This is important to help develop students’ self-study abilities.

| Current GEC (GEC 2006) | New GEC (GEC 2018) |
|-----------------------|---------------------|
| Content oriented (What students should know.) | Competency oriented (What students should do.) |
| Identical educational content (no clear career orientation) | Two phases: basic education (Grades 1 to 9) and career-oriented education (Grades 10 to 12)* |
| Science subjects are single subjects from grade 6 to grade 12, including: Biology, Physics (start from grade 6); and Chemistry (start from grade 8). | Science subjects are integrated at lower secondary level and named as Natural Science. Then these subjects are taught separately as Physics, Chemistry, Biology at upper secondary level (grade 10 to 12) |
| One textbook set 17 subjects | Many textbooks sets 13 subjects |

* Includes compulsory subjects and activities, selective career-oriented subjects, and elective subjects.
6.4 **Science Education in Vietnam’s GEC 2018**

With this new approach, science education in the new Vietnam's GEC has developed from primary to upper secondary curriculum based on the rule that content is integrated in lower-level education and differentiated at higher levels. This principle is demonstrated in Figure 5.

In this system, the subject Nature and Society (Grades 1 to 3) includes topics such as family, school, local community, plants and animals, humans and health, and earth and sky. Science (Grades 4 and 5) consists of substances, energy, plants and animals, fungus and bacteria, humans and health, and creatures and the environment.

The subject of natural science at lower secondary level in particular is new in GEC 2018. This new subject is built and developed on the basis of physics, chemistry, biology and earth sciences, including things, phenomena, processes, basic attributes of existence, movement of the natural world, and general principles and concepts of the natural world. The subject, therefore, has become a typical subject in the new GEC that help to significantly reduce the number of science education learning periods in lower secondary schools (Figure 6).

Much more important, the new integrated natural science subject offers students full topics linked to daily life and provides integration pathways to solve real problems, as opposed to the current GEC, where students study natural science through single subjects (such as Physics, Chemistry, and Biology), which may not help learners to see the problems systematically and where in some situation students repeatedly study the same problems and content.

The innovations in the content and learning periods of science education in the new GEC have required new teaching and learning methods. Some new approaches have been suggested such as integration, differentiation; learner-centered approaches, and STEM education on open content and appropriate topics. Teachers therefore have important roles in implementing educational
innovation. At present, the standards for evaluating the quality of teachers in primary, secondary, and high schools and at college and university levels have been established in Vietnam (Nguyen, C.K; Nguyen, Q.V., 2018). The new GEC, thus, requires new teacher career standards, which affect to teacher training and retraining programs.

7 Teacher Training

7.1 Pre-Service Teacher Training

In Vietnam, pre-service teachers enter education programs as undergraduate students and take four years of coursework and complete about 10 weeks of student-teaching practicum. The practicum may be divided into two periods: the first five-week practicum in third year and the second five-week practicum in final year of the course. This is the time to practice teaching in high school and microteaching practice at pedagogical universities. The coursework at education universities has three main parts: the general academic unit, the specialized academic unit, and training for the pedagogical profession. The general academic unit includes subjects such as philosophy, foreign languages, educational psychology, and Vietnamese practice. The specialized academic unit focuses on learning theory with application to subject teaching methods. This section also focuses on training prospective teachers to teach and develop students’ capacities according to the subject program in the national general education program. The training for the pedagogical profession accounts for

![Figure 6: Number of learning periods of science subject: a comparison between current and new GEC (one learning period is equivalent to 45 minutes)](https://creativecommons.org/licenses/by/4.0/)
25% of the total teacher-training curriculum and consists of students’ practice teaching inside and outside pedagogical universities.

In terms of science teacher education for secondary level, this credit-based training process includes from 120 to 140 credits, with 15% in the general academic unit, 60% in the specialized academic unit, and 25% in the pedagogical academic unit. The specialized academic unit of science teacher education differs from program to program, depends on students’ choice when they enroll the universities. For example, if they choose to become a teacher of Physics, they have to study Physics science mainly among specialized academic unit. There are two types of science teacher training in Vietnam: the concurrent education model, which is more popular, and the consecutive education model (Hoang & Ninh, 2017). Each model has its own advantages in teacher professional development. In the concurrent education model, the student takes classes in specialized and pedagogical academic units at the same time. In the consecutive education model, the student completes the science academic unit in the first three years before studying education science subjects (Figure 7).

To become teachers at primary level, students also spend 4 years to finish their bachelor degree. However, in terms of science knowledge, students just study general knowledge, instead of specializing in Physics, Chemistry or Biology as prospective teachers of science at secondary level. The structure of the science teacher education program has been further updated to increase professional knowledge and pedagogical practice in order to meet student outcome standards. The combination of the science teacher training program and the general education system has in practice become closer over time. This link between science teacher education universities and general education institutions helps students to enhance their professional practices.

![Figure 7](https://example.com/figure7.png)

**FIGURE 7** The pathway to become a science teacher at secondary level
After completing all requirements, teacher candidates will receive an education college diploma. In Vietnam, teacher candidates do not have to take the national teaching exam to get teaching licenses. Students who graduate from teacher education programs in Vietnam will become nationally certified teachers if they are recruited into public or private schools. There is no difference in the requirements for teacher qualification between public and private schools. Private schools compete by offering high salaries in order to recruit good teachers. Public schools, on the other hand, often offer stable job positions and pension plans for workers. In Vietnam today, high-quality public schools in urban areas are still attractive places for good pedagogical students to enroll. However, teacher recruitment criteria depend on the educational development planning of each province. The situation of teacher redundancy often occurs because pedagogical institutions train teachers according to their own capacities without taking into account the actual need for teachers in their localities. This can make it difficult for prospective teachers to find jobs when they graduate. If newly graduated teachers cannot access good public schools, private schools will be their choice.

7.2 In-Service Teacher Training

In-service teacher education programs (ITEP) in Vietnam specifically aim to update teachers on political and socio-economic issues, foster political and professional attributes, and develop practical competencies in teaching, educating, and other areas based on professional standards for teachers and the need to improve and reinforce educational quality. Likewise, after their training, teachers are expected to be capable of self-study, self-assessment, and organization of self-training activities in their educational institutions or departments. The most important purpose of ITEP is enhancing teachers’ competences in order to meet job positions’ requirements.

According to the Ministry of Education and Training’s (MOET) regulation (No. 17/2019/TT-BGDĐT, 2019), each teacher is required to complete 120 class hours (one class hour is equivalent to 45 minutes) of in-service training per year, including:

- Training Program 1: regulated by MOET to address the need to fulfill teaching requirements in a school year based on educational levels (40 class hours per school year).

- Training Program 2: regulated by Department of Education and Training (DOET) to address the need to implement local educational development tasks, including training content delivered under training projects (40 class hours per school year).
Training Program 3: addresses the need to continually develop teachers’ professional careers with the aim of meeting job positions’ requirements (40 hours per school year). MOET promulgates 15 optional modules for teachers. The duration of each type of training content can be modified according to school year planning and requirements of local education systems. Only universities of education, institutes, which have faculties of education or centers for in-service training, have permissions from MOET to deliver the ITEP.

ITEP are currently run in various ways: self-studying (in parallel with group discussions in educational institutions, departments, or associations), face-to-face training courses (self-study coaching, problem solving, practicing, and experience sharing), online learning and blended learning. Materials used for in-service teacher training include textbooks, audio, videos, and other media. Budgets for in-service teacher through learning education are estimated based on annual recurrent expenditures, national programs, projects, and other sources.

In terms of science teacher professional development, GEC 2018 has led to changes in in-service science education teacher training. One of the greatest challenges for teachers who normally taught single science subjects has been becoming acquainted with delivering integrated science topics. This trend has created a need to rapidly increase in-service teacher training in science education teaching and learning. The MOET has launched the Enhancing Teacher Education Programs, sponsored by the World Bank, which aims to develop in-service teacher education programs for both general education and science education teachers.

These programs have equipped science teachers with science education knowledge and skills such as goals, content, student outcome requirements, and science education methodologies. Attending these programs, science teachers have opportunities to enlarge their science education knowledge, develop integrated teaching methods, and learn how to help students apply science education knowledge in practice. In addition, science teachers are able to self-study, observe colleagues’ classes and take part in professional meetings, and design science education curriculums to be more confident in science education teaching.

8 Conclusion

One of Vietnam’s strategies to achieve further economic growth is the modernization of its education system. The five resolutions for education reform are...
improving the institution and promoting administrative reforms, enhancing the management capacity of educational administrators, increasing investment resources for education, strengthening educational quality assessment, and increasing promotion (General Secretary, 2013). Like other parts of Vietnam’s education system, teacher education is changing. The MOET seeks to strengthen teacher training while simultaneously trying to respond to teacher shortages.

Science education in Vietnam only started after the feudal period. It was first launched during the French colonial period, but the content was basic and mainly for French pupils. Science education has been strongly promoted since the August Revolution in 1945. Science teacher education since then has promoted training and periodic re-training. That these efforts have paid off can be seen by Vietnamese students’ PISA results being comparable with developed countries. In the new Vietnamese GEC, science education has become one of the most innovative fields. Science teachers study and become familiar with teaching science in an integrated way that demands that science teachers be equipped with new knowledge and teaching methods.

Abbreviations

GEC General Education Curriculum  
ITEP In-service Teacher Education Programs  
MOET Ministry of Education and Training

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Ethics Considerations

The data collected from this article did not involve human subjects so no human subjects approval was necessary.

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### Appendix 1

**New general education curriculum for primary level in Vietnam**

| Educational Plan | Periods each school year per grade |
|------------------|-----------------------------------|
| **Compulsory Subjects** | **Grade 1** | **Grade 2** | **Grade 3** | **Grade 4** | **Grade 5** |
| Vietnamese language and literature | 420 | 350 | 245 | 245 | 245 |
| Math | 105 | 175 | 175 | 175 | 175 |
| Foreign Language 1 | – | – | 140 | 1140 | 140 |
| Ethnics | 35 | 35 | 35 | 35 | 35 |
| Nature and Society | 70 | 70 | 70 | – | – |
| History and Geography | – | – | – | 70 | 70 |
| Science | – | – | – | 70 | 70 |
| Computing and Technology | – | – | 70 | 70 | 70 |
| Physical Education | 70 | 70 | 70 | 70 | 70 |
| Arts (Music, Fine Arts) | 70 | 70 | 70 | 70 | 70 |

| Compulsory Education Activity | |
|-----------------------------|---|
| Experiential activities | 105 | 105 | 105 | 105 | 105 |

| **Elective subjects** | |
|-----------------------|---|
| Ethnic minority language | 70 | 70 | 70 | 70 | 70 |
| Foreign language 2 | 70 | 70 | – | – | – |

| Total periods per school year (excluding elective subjects) | 875 | 875 | 980 | 1,050 | 1,050 |
| Average periods per week (excluding elective subjects) | 25 | 25 | 28 | 30 | 30 |
### New general education curriculum for lower secondary level in Vietnam

| Compulsory Subjects                  | Grade 6 | Grade 7 | Grade 8 | Grade 9 |
|--------------------------------------|---------|---------|---------|---------|
| Literature                           | 140     | 140     | 140     | 140     |
| Mathematics                          | 140     | 140     | 140     | 140     |
| Foreign language 1                   | 105     | 105     | 105     | 105     |
| Civic education                      | 35      | 35      | 35      | 35      |
| History and Geography                | 105     | 105     | 105     | 105     |
| Natural Science                      | 140     | 140     | 140     | 140     |
| Technology                           | 35      | 35      | 52      | 52      |
| Computing                            | 35      | 35      | 35      | 35      |
| Physical Education                   | 70      | 70      | 70      | 70      |
| Arts (Music, Fine Arts)              | 70      | 70      | 70      | 70      |

**Compulsory Education Activity**

| Experiential and career-oriented activities | 105 | 105 | 105 | 105 |
| Local educational content               | 35  | 35  | 35  | 35  |

**Elective subjects**

| Ethnic minority language       | 105 | 105 | 105 | 105 |
| Foreign language 2             | 105 | 105 | 105 | 105 |

**Total periods per school year (excluding elective subjects)**

| Grade 6 | Grade 7 | Grade 8 | Grade 9 |
|---------|---------|---------|---------|
| 1015    | 1015    | 1032    | 1032    |

**Average periods per week (excluding elective subjects)**

| Grade 6 | Grade 7 | Grade 8 | Grade 9 |
|---------|---------|---------|---------|
| 29      | 29      | 29.5    | 29.5    |
Appendix 3

New general education curriculum for upper secondary level in Vietnam

| Educational Content                                      | Periods each school year per grade |
|----------------------------------------------------------|-----------------------------------|
| **Compulsory Subjects**                                  |                                   |
| Literature                                               | 105                               |
| Mathematics                                              | 105                               |
| Foreign Language 1                                       | 105                               |
| Physical Education                                       | 70                                |
| National Defense and Security Education                  | 35                                |
| **Selective subjects**                                   |                                   |
| **Social Sciences**                                      |                                   |
| History                                                  | 70                                |
| Geography                                                | 70                                |
| Economic and legal education                             | 70                                |
| **Natural Sciences**                                     |                                   |
| Physics                                                  | 70                                |
| Chemistry                                                | 70                                |
| Biology                                                  | 70                                |
| **Technology and Arts**                                  |                                   |
| Technology                                               | 70                                |
| Computing                                                | 70                                |
| Music                                                    | 70                                |
| Fine Arts                                                | 70                                |
| **Elective learning special topics (3 clusters of special topics)** | 105                         |
| **Compulsory education activity**                        |                                   |
| Experiential and career-oriented activity                | 105                               |
| **Local educational contents**                           |                                   |
|                                                          | 35                                |
| **Elective subjects**                                    |                                   |
| Ethnic minority language                                 | 105                               |
| Foreign language 2                                       | 105                               |

Total periods each school year (excluding elective subjects) 1,015
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