

# The application of STEAM teaching: A case study of STEAM teachers' beliefs and practice at secondary schools in Ho Chi Minh city

Ho Truc Chi\*



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## ABSTRACT

With the expansion of science, technology, engineering, art, and math (STEAM) schools across Vietnam and the world, new roles for teachers and educators are being designed and with these ones, their identities are increasingly developing. However, these roles are still a poorly defined area in STEAM. Therefore, this article aims to discover the beliefs and teaching practice of STEAM teachers at secondary schools in Ho Chi Minh City (HCMC), including answering the two research questions: (1) What are the teachers' beliefs towards applying STEAM in teaching? (2) How do teachers practice STEAM in teaching?

A case study design was employed to find out the two research questions in STEAM teaching at two secondary schools in HCMC. The data for the study were collected from observation and semi-structured interviews with six teachers at two STEAM secondary schools in HCMC to answer these two research questions 1. What are the teachers' beliefs towards applying STEAM in teaching? 2. How do teachers practice STEAM in teaching?

The result: The findings indicate the teachers' belief about the importance of STEAM teaching for students' learning; through the results of observation and interview, the research also consolidates some characteristics of a good STEAM lesson. Besides, some disadvantages when applying the STEAM teaching method are also revealed. The teachers' STEAM applications are also mentioned clearly in the research result.

This study concludes that STEAM teachers' practice and beliefs can be considered as a highly dynamic, creative, and developing process. The efforts of teachers to bring interesting lessons about STEAM have aroused students' interest and curiosity as well as stimulated their learning passion. The consistency between a teacher's personal beliefs and practice as well as STEAM understanding is essential for successful STEAM teaching at high schools in HCMC.

**Key words:** STEAM teaching, STEAM teachers' belief, STEAM teacher's practice

FPT University

## Correspondence

Ho Truc Chi, FPT University

Email: chiht7@fpt.edu.vn

## History

- Received: 05-8-2022
- Accepted: 02-02-2023
- Published: 12-02-2023

## DOI :

<https://doi.org/10.32508/stdjssh.v6iS1.796>



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## INTRODUCTION

The conversion of the education system is urgently requiring support for a privileged and exceptional education system for the next generation to be strong enough to compete globally and create economic sustainability for the nation. Therefore, the education programs were developed to produce an engaged human resource and a labor force through Science, Technology, Engineering, and Mathematics education and Art (STEAM). Combining the five components of knowledge to shape the cutting-edge one might undoubtedly be implemented through STEAM education. Over the last few decades, STEM has been emphasized in the education of secondary school students, but little focus is on the importance of the STEAM education to them (Dejarnette, 2018)<sup>1</sup>. According to Nguyen Vinh Hien (2019) - Former Deputy Minister of Education and Training, the inclusion

of STEAM in schools is facing some difficulties, for example, exam regulations, and quality assessment are still backward; cognitive and skills limitations of teachers; facilities in schools are still lacking, especially in rural and remote areas. There are a lot of documents that mentioned teachers' STEAM education, but we still haven't reached a consensus about the awareness and approach to STEAM education<sup>2</sup>. Tran Minh Triet (2019) - Vice President of the University of Natural Sciences in Vietnam also pointed out that most STEAM teaching force comes from many different backgrounds, and few people are fully trained in STEAM. Training needs to set a vision that is not the result of the subjects, but the result is a way to mature in thinking, training thinking skills for students, in which the guiding role of the teacher is essential<sup>3</sup>. Teaching pervasive theories to get students to pass exams in Vietnam is not a scientific teaching method.

**Cite this article :** Chi H.T. The application of STEAM teaching: A case study of STEAM teachers' beliefs and practice at secondary schools in Ho Chi Minh city. *Sci. Tech. Dev. J. - Soc. Sci. Hum.*; 6(S1):42-51.

Especially when the world is constantly evolving and changing every day, we need to apply STEAM as an essential educational method, helping children know how to solve problems in life later (Chen et al., 2021)<sup>4</sup>. Therefore, this study aims to develop a STEAM teaching plan for secondary school students through the lenses and experiences of STEAM teachers in HCMC.

## LITERATURE REVIEW

STEAM branched out state-of-the-art pathways in teaching and learning science, technology, engineering, and mathematics as discrete and individual subjects. The STEAM field combines these five areas, designed to integrate learning to open doors to the real world and places, situations, and actual applications (Stohlmann et al., 2012)<sup>5</sup>. STEAM may educate students to become successful scientists, as they need to develop critical thinking skills (Csikszentmihalyi, 2000)<sup>6</sup>. Creativity in STEAM revealed promising results in current research fostering motivation of students (Chappell et al., 2019; Conradt & Bogner, 2020b; Hetherington et al., 2020)<sup>7</sup>. Robert and Cantu (2012) pointed out that the integration process enabled learners to discover, gather, and synthesize information and knowledge except for the limitation of disciplines and distinctions<sup>8</sup>. STEAM education can help the next generation of students to solve real-world problems by applying concepts that cut across disciplines as well as capacities of critical thinking, collaboration, and creativity (Burrows and Slater 2015)<sup>9</sup>. El-Deghaidy and Mansour (2016) stated that combining STEAM teaching in the curriculum was a particular case that was essential and necessary in the evolution of education in the era of industry 4.0<sup>10</sup>. Besides, creativity in STEAM disclosed good results in developing motivation of students (Chappell et al., 2019; Conradt & Bogner, 2020b; Hetherington et al., 2020)<sup>7</sup>. Abilities required by learners so as to thrivingly meet the demand of education 4.0 might be implemented efficiently via the combination of educational programs or syllabuses of the STEAM teaching. In order to build a competing and ambitious scientific and academic environment through the application of the STEAM teaching, each educator and teacher acts as a key and vital factor in reaching educational objectives. The educator and teacher's responsibility is to transmit knowledge to students and determine the success of education transformation. According to Knoell (2012), teachers should gain an overall capacity, qualification, and knowledge to have an effective teaching method and style<sup>11</sup>. Research has shown that teachers' value for STEM education affects their willingness to embark and put

a STEM-based approach into action (Margot & Kettler, 2019). Teachers' pedagogical beliefs and practices about what they may achieve through their pedagogy affect their teaching behaviors<sup>12</sup>. Also, the developed global recognition given to STEAM has created a need to assist productive teaching pedagogy and accomplishment practices in early classroom settings. STEAM-related professional skills have opened new capacities for teaching STEM education (Roberts et al., 2018)<sup>13</sup>. With the focus on developing STEAM teaching at secondary school, this study figure out and identifies teachers' beliefs and practice in STEAM education and the components that affect their willingness and encouragement in STEAM education.

## METHODOLOGY

### Research question

The present study, in light of the previous research and the above-mentioned purposes, will address the following research questions:

1. What are the teachers' beliefs towards applying STEAM in teaching?
2. How do teachers practice STEAM in teaching?

### Research Design

This study applied a case study design for the teachers from two famous STEAM schools representing the case unit. More specifically, with employing a case study design, this research utilized observation and interviews to gain insights into teachers' beliefs towards the role of STEAM, their practice of using STEAM, the students' reactions, and their follow-ups. According to Creswell (2012), qualitative research is a means for exploring and understanding a social or human problem through exploring the individuals or groups' attitudes, behavior, and experiences<sup>14</sup>. Case study research offers opportunities for researchers to investigate particular phenomena within a real-world setting and therefore build a holistic and realistic picture of the issues under investigation (Basse, 1999)<sup>15</sup>. Similarly, Mackey and Gass (2005) stated that a case study was a useful research methodology when seeking a comprehensive description of language teaching and learning settings or a phenomenon within a specific group of a population<sup>16</sup>. For that reason, a case study design was selected for its appropriateness.

### Participants

Prior to this research, the researcher had conducted a quantitative study investigating the types of questions that the teachers at these two schools used to check

**Table 1: The information of the teachers**

No	Year of Teaching Experience	STEAM Experience	Teaching	School	Subject and Grade level	Gender	Age
1	14 years	4 years		Le Loi	Maths (Grade 8)	Female	37
2	6 years	3 years		Le Loi	IT (Grade 9)	Male	28
3	5.5 years	3 years		Le Loi	Art (Grade 9)	Male	31
4	12 years	4 years		Le Quy Don	Technology (Grade 9)	Female	35
5	3 years	2 years		Le Quy Don	Math (Grade 8)	Female	25
6	10 years	3 years		Le Quy Don	Art (Grade 9)	Male	33

Source: Teachers’ profiles from Le Loi and Le Quy Don Secondary Schools – HCMC (2020)

teachers’ beliefs related to the STEAM usage in the classroom. The participants were purposefully chosen because of their energetic involvement and contribution to the STEAM programs of each school. The reason for such purposeful sampling was that currently, STEAM at high schools has not been applied much, so the researcher selected candidates who had been trained in STEAM teaching skills before to conduct this study. Also, the researcher wanted to draw a purposive sample that was most accessible while meeting all selection criteria. The participants had various groups of teachers with regard to gender, experience, age, and background. The information of the six teachers recruited in this research is described in Table 1.

**Research instrument**

The purpose of this study was to provide a description of the teachers’ beliefs towards and experiences with the use of STEAM in teaching. The data were collected in the forms of observation and interview.

**Observation**

The aim of utilizing observations in this study was to explore the teachers’ practice of teaching STEAM in the classrooms. Furthermore, the results from the observations compared and contrasted with those from the interviews would indicate any discrepancies between the teachers’ stated beliefs and actual practice because, as Robson (2002) said, what people do could differ from what they say they do, and observation provides a reality check<sup>17</sup>. According to Creswell (2012), observation is the process of gathering open-ended, firsthand information by observing people and places at a research site<sup>14</sup>. The observation scheme of this study was separated into two different stages. The

first stage dealt with general information such as the observation date and time, the number and level of students, the lesson overview, and the observed target structure(s). The second stage consisted of the five observation domains: (1) setting context, (2) teaching stages, (3) teachers’ teaching STEAM, (4) How STEAM is directed (to the whole class or to individuals), and (5) students’ responses and reactions to teachers’ STEAM.

**Interview**

This study employed the semi-structured interviews. The interviewers were given open-ended questions, allowing them to have their point of view and discussion rather than answering a straightforward question and answer format. According to Stollmann (2012), open-ended questions in the interview can help motivate and inspire weighty and significant answers based on interviewees’ general understanding about the issues and their freedom of expression to express their opinions<sup>18</sup>. Moreover, Mizzi (2013) stated that the semi-structured interview questionnaire was likely to be less subjective and leading<sup>19</sup>. When the researcher synthesizes and analyzes the data in detail, it helps them get more extra information to identify the issues efficiently with the ongoing practice of teaching and evaluate the teachers’ feelings and beliefs to develop and renovate the classroom situation. Below were the interview questions for the study:

1. What are your beliefs about STEAM that aligns with your philosophy of teaching?
2. Do you think that STEAM teaching is important at high school? If so, how important is it? What are the benefits of teaching STEAM to secondary school students?

3. What are some criteria which are considered essential characteristics of a good STEAM lesson?
4. What are some drawbacks when applying STEAM in the classroom?
5. What are your STEAM strategies and applications in the classroom?
6. How do the students react to the STEAM application in the classroom? What are their attitudes?

Data and analysis obtained from interviews would be coded. The researcher started labeling and organizing the qualitative data to identify different themes and the relationship between them to build appropriate thematic network results from the interview data.

### Data collection procedure

To collect data for this study, the researcher communicated with the manager of the campus to obtain permission to conduct the study at the field site. Firstly, the observations took place from September 2020 to November 2020 at the research site. Each class was attended once during the STEAM lessons. The two main instruments were used in the data collection. With regard to the observational data, apart from the on-site notes in the observation scheme, the researcher also used a video recorder in her mobile phone to record the teachers' lessons with their consent. Secondly, after the observations were conducted, the researcher made appointments with the teachers to arrange the interviews. Two of them took place in person and the other three were conducted via video call due to the time availability (the video contact allowed more flexibility in terms of time and venues). Each interview lasted from 20 to 25 minutes. The researcher used a set of questions as a guide and ensured that all of the questions were answered.

### Data analysis

The data analysis took place throughout the data collection. This procedure began with typing the field notes and transcribing the interviews and then the researcher read the entire description in order to grasp the sense of the whole. Each field note and the transcript were reviewed multiple times. During this review, the statements related to the research questions were noted. The data analysis continued with the data sorting and arranging, data coding, and grouping the statements into the categories or the themes that evolved from the analyzed data. After that, the researcher labeled the themes and described the connections between them. Finally, the researcher constructed an overall descriptive summary answering the research questions. The data were coded and grouped into the themes, as illustrated in Figure 1.

## FINDINGS AND DISCUSSION

The two main themes emerged thanks to the analysis of the data collected from the observations and interviews. The results were employed to answer the research questions, which described the participants' beliefs and practice with the regard to teaching STEAM at secondary schools. The key points below are the detailed description of the findings.

### Teacher's beliefs

The awareness of STEAM across the six participating teachers affected their conceptions of STEAM teaching in many different ways. During the interview time, the teachers conceptualized and stressed the importance of applying STEAM in teaching. In question 1 of the interview, all of the teachers totally agreed with the idea that STEAM teaching played a vital role in the development of students. These answers and justifications they gave were displayed in Table 2.

As the results from the Table 2, the importance of STEAM teaching was confirmed. Many teachers had a positive view of STEAM education, believing that it would have a positive impact on students' learning outcomes. The finding of this study was consistent with previous studies, which mentioned the necessary of teachers's belief toward STEAM education (Csikszentmihalyi, 2000)<sup>6</sup>, (Chappell et al., 2019; Conradt & Bogner, 2020b; Hetherington et al., 2020)<sup>7</sup>. With regard to STEAM, participants' views reflected through the interviews and observations would be described and discussed in the following sub-sections.

### The benefits of STEAM teaching for students' learning

All of the teachers totally agreed that STEAM gives many benefits to students. Teacher 1 said that STEAM helped students develop their technology literacy. "STEAM motivated students to incorporate technology, computer programming, and engineering into class-work and projects." (T1). Another participant pointed out that "STEAM can give students real-world applications in their work, which prepare them for the future career" (T5). As a matter of fact, understanding science would benefit students in their careers. It also offered a promising approach to promote the creativity that meets the state-of-the-art beliefs of learning and success in the 4.0 era. This finding completely coincided with the results of previous studies which mentioned earlier in the literature review about the advantages of STEAM teaching to students, namely Robert and Cantu, (2013)<sup>8</sup>, (Chappell et al., 2019; Conradt

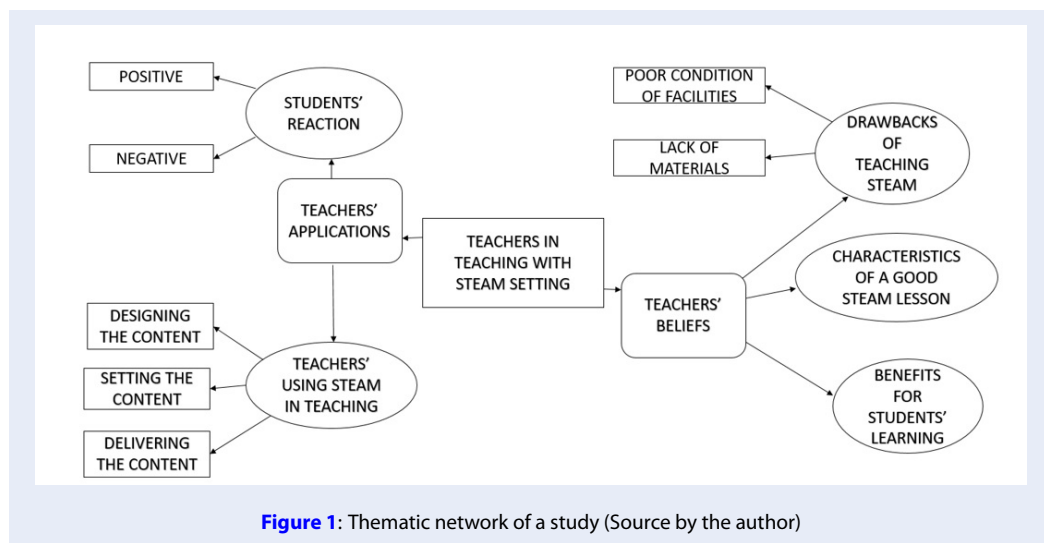


Figure 1: Thematic network of a study (Source by the author)

Table 2: Teachers' points of view about the importance of STEAM teaching at schools

The importance of STEAM teaching at secondary schools	Teachers' answers
Teacher 1	STEAM plays a very important role in teaching and learning.
Teacher 2	
Teacher 3	
Teacher 4	
Teacher 5	
Teacher 6	
Teachers' answers in detail	
Teacher 1	"This is undoubtedly the utmost purpose of teaching."
Teacher 2	"Because STEAM is the foundation for being good at the other subjects."
Teacher 3	"Having a strong STEAM background would form a better foundation in the future career."
Teacher 4	"Teach students how to think critically, solve problems, and develop creativity."
Teacher 5	"Prepare students for life, regardless of the profession they choose to follow."
Teacher 6	Teach students how to think critically and how to solve problems."

(Source by the author)

& Bogner, 2020b; Hetherington et al., 2020)<sup>7</sup>. Beside that, the results and findings of students' reactions to teachers' STEAM shown in the observations match with the interview one. As described in methodology section, in the observation scheme, the students' reactions were categorized into positive and negative ones, with the positive reactions including the correctness, enthusiasm, and motivation in STEAM learning. Most of the participants in the study have a favorable view of almost all the STEAM subjects. It also helps them express their critical thinking abilities through exploring complex issues. The results also pointed out that teachers were the most crucial factor in attracting young people into the STEAM fields and fostering their problem-solving skills, collaboration, creativity, and preparing students to succeed in their future careers. They were responsible for students' interest in studying a STEAM field. This was probably owed to how teachers knew how to make learning science and mathematics funny and enjoyable. As a result, teachers should be trained regarding multi-, inter-and transdisciplinary approaches to the STEAM fields.

### **Characteristics of a good STEAM lesson**

The teacher generally shared their opinions regarding the characteristics of a good STEAM lesson in classrooms. Teacher 3 and teacher 4 stated that the content of the STEAM needs to be relevant to everyday problems. Teacher 3 further clarified why she thought the relevant contents were indispensable criteria "*because students can investigate and seek solutions for real and relevant social, economic, and environmental problems.*" (T3). Similarly, teacher 4 also described "*STEAM learning is mostly regarding designing creative solutions to real-world issues.*" (T4). In general, to teach STEAM lessons successfully, teachers need to search the appropriate contents and topics for each grade and design suitable materials and activities. Besides, teachers should also mention the nature of lessons, illustrate how STEAM could support students actively to participate in their learning process, and help them unlock answers themselves rather than memorize for their exams.

### **Drawbacks when applying STEAM teaching in classrooms**

#### ***The shortage of reference materials for teachers***

The findings of this study pointed out that inadequate STEAM reference materials will affect teachers' willingness and enthusiasm in applying STEAM teaching in the classroom environment. As teacher 2 mentioned that:

*I still do not understand what needs to be done to integrate all STEAM subjects in one teaching session due to the lack of information on STEAM. Also, I found that some science teachers are hesitant to teach integrated science subjects because it isn't their expertise.*

Also, teacher 4 claimed "*There are no guidelines for what students should be learning or how qualified the teachers are to need to start teaching*" (T4). These problems were easy to explain because nearly all teachers were specialized and experts in only one or two subjects. It depended on their major at their undergraduate level. For instance, if the teacher studied Engineering at university, they might not encounter any difficulties teaching engineering and technology. Nevertheless, they would have problems if assigned to teach other subjects such as art and chemistry, which are some of the STEAM elements. In consideration of that, teachers needed further reference materials and additional training to support and encourage them in their STEAM education implementation.

#### ***Poor condition of laboratory facilities***

As regards the effects of asking bad points when teaching STEAM, the teachers also shared their opinions. In particular, all interviewees claimed that the drawback of STEAM teaching to the students is the inadequate school facilities. Specifically, teacher 1 claimed that "*there is the lack of facilities, limitations in technology, and limited time for teachers in the teaching time frame*" (T1). The poor condition and environment of equipment in the laboratory might bring them about feeling unwilling to apply STEAM teaching. In addition, according to teacher 2, "*under-performing students can get left out*" (T2). As teacher 3 mentioned, "*students' passion in STEAM learning is still low, some of whom do not know the importance of STEAM learning*" (T3). If these problems last for an extended period, the students may get bored with the STEAM lessons. They will have some negative responses comprising their wrong behaviors as well as bored, reluctant, or confused attitudes. One of the other policy implications for STEAM education would be equipping pedagogical tools to be able to integrate different subjects into learning activities. Therefore, teachers should have chances and experience with software, tools, and facilities for excellent classroom use to attract students' engagement. Schools that are well equipped with relevant educational facilities, which comprise instructional materials such as textbooks, libraries, and even laboratories, do much better in standardized examinations than those which do not have resources. Then the main factor that ignites teacher effectiveness in teaching in schools is the availability

of instructional materials such as charts, textbooks, and syllabi. However, students still fail if teachers lack didactical and pedagogical skills and if these resources are underutilized. In general, teachers must utilize innovative methods and pedagogical approaches adequate to STEAM education to deal with challenges.

### Teachers' applications

In this section, the teachers' application of STEAM teaching would be described and then discussed. Furthermore, how the students reacted to the lesson and how the teachers followed those reactions would also be analyzed. The data used for analysis were combined from observations and interviews.

### Preparing and designing the content

Based on several drawbacks compared in the study, the difficulties faced by the teachers are varied. Therefore, they should have good preparation in designing and preparing the content. Regarding the STEAM lesson planning before class, Teachers 4 and 6 answered that they took a good look at the required science and math objectives and planned the lesson around one or more of these. One of the other teachers responded that teachers needed to grasp the content and good ideas for the lesson. Teacher 6 further explained:

*The best idea is to create opportunities for math, science, and technology teachers to research and develop lessons altogether. Thus, teachers can notice how students might creatively apply their STEAM knowledge to solve their challenges logically when suitable.*

The STEAM approach had a positive impact on learning. Thus, teachers should be aware of the necessity of STEAM to become engaged and motivate students to participate in the STEAM lessons actively. In addition, teachers should exchange more experience with their colleagues and take part in training to develop their professionalism, which is ready to use the STEAM approach in teaching.

### Method and medium of instruction in STEAM content

According to the results from the observation, although the teachers did it in various ways, they all started to set contexts before presenting STEAM. They varied from materials, mini-stories, methods, and laboratory instruments to example lessons and focused on how to develop cognition, emphasizing learning through students' new experiences and perspectives. For instance, creative practices in mathematics, engineering, and technologies include establishing physics laboratories, interactive tables, and

floors. Activities of biology such as water discovery, soil, plants, animals, and natural phenomenon employing a magnifying glass, a microscope, and setting up tanks for water collectors are implemented more often. Some teachers regularly utilize those activities. Besides, according to the results from the interview, as commented by teacher 5, the contexts were of utmost importance to him because they were the lead-in of the lesson, so he took them very seriously. During the observations and interviews, all the teachers applied STEAM in different teaching stages. Some of them applied STEAM practice several times again during the practice stage or wrap-up, depending on the ability of each class, as reported by teachers 3 and 6 in the interviews. Also, teacher 5 directed his questions to specific the students during the observation time. He explained in the interview:

*I will not call the exemplary students, whom I know have understood the STEAM learning process. I will call the nervous ones. Although good students may help weak ones when they work in teams, I can know what they are struggling with when I ask weak students more and more questions. Sometimes, it turns out that even good students don't know the answer. Then, I can know what point my students have not clearly understood.*

In short, this section described the teachers' STEAM using from the planning stage to the implementation one. The teachers should be flexible in providing the adequate STEAM time for planning and delivering the lessons. In the following section, the students' reactions to their teachers' STEAM would be presented.

## CONCLUSION

The main aim of this case study is to explore the beliefs, which teachers hold towards applying STEAM and their experience in STEAM teaching. In order to answer the research questions, the study employs the observations and the interviews to collect the data. From the study results, although the participants perceived STEAM as essential and beneficial, there are disputes on their materials, facilities, and teacher training at different students' levels. Regarding the second question related to teachers' STEAM application in the classroom, the results show that the teachers have different strategies and methodologies to deliver STEAM lessons. In conclusion, although STEAM is considered an effective way of developing a student's creativity engagement, teachers should use it to different extents, in different ways, and yield different results. Also, there are both consistencies and discrepancies between the teachers' beliefs and practice. Overall, the findings of this study corroborated

what has been known in the field and gained more insights into the teachers' beliefs and the problematic issues that existed in the way teachers made use of this teaching technique.

Last but not least, based on the findings and results of the study, there is a vital need for ongoing training and continuous professional development to enhance and improve teachers' belief and courage in STEAM teaching at secondary schools in HCMC. Regarding the shortage of teaching-learning facilities, educators need to think outside the box, set free for more creativity, take risks to thrive and develop to have highly skilled, good teaching practices, and have a great number of personal resources to aid their teaching. School administrators should have funds for the areas where facilities are extremely needed. They must provide sufficient teaching facilities and regular support for better enhancement where essential. Also, collaboration is necessary for the STEAM teaching process to be successful due to the multidisciplinary integration characteristic. For example, math or science teacher should collaborate with art teachers in designing and implementing STEAM curriculum. Furthermore, STEAM preparation programs for teachers must be thought-about to support teachers in solving and dealing with any difficulties or challenges during the STEAM implementation time. Because teachers' beliefs about STEAM teaching and learning play an essential role in their selection and promulgation of instructional practices, it is necessary to understand the influence that different school settings may have on improving and changing teachers' beliefs and practices. These professional development programs can bring about new knowledge and trendy teaching tendencies, thus can make teachers more confident and well-equipped to apply the STEAM education effectively to students.

## LIST OF ABBREVIATIONS

HCMC: Ho Chi Minh City

STEAM: science, technology, engineering, art, and mathematics

## STATEMENT OF AUTHORSHIP

I hereby certify my authorship of the article submitted today and entitled:

The application of steam teaching: A case study of steam teachers' beliefs and practice at secondary schools in Ho Chi Minh city

The article has not been submitted for the award of any journal or book in any other situation.

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## REFERENCES

1. Dejarnette NK. Implementing STEAM in the early childhood classroom. *Eur J STEM Educ.* 2018;3(3):18;Available from: <https://doi.org/10.20897/ejsteme/3878>.
2. Hiền NV. Tiếp cận dạy học STEAM trong giáo dục phổ thông hiện nay. *Tạp Chí Giáo Dục.* 2019, Số 459 (Kì 1 - 8/2019):1-8;.
3. Tran M-T. STEAM education in Vietnam Conference on STEAM education, April 23, 2019, Fullbright university. Vol. 2019. Ho Chi Minh City, Vietnam; 2019;.
4. Chen DJ, Lutomia AN, Pham VTH. STEM education and STEM-focused career development in Vietnam. *Palgrave Macmillan;* 2021. p. 173-98;Available from: [https://doi.org/10.1007/978-3-030-51533-1\\_7](https://doi.org/10.1007/978-3-030-51533-1_7).
5. Stohlmann M, Moore T, Roehrig G, McClelland J. Year-long impressions of a middle school STEM integration program. *Middle Sch J.* 2011;43(1):32-40;Available from: <https://doi.org/10.1080/00940771.2011.11461791>.
6. Csikszentmihalyi M. *Beyond boredom and anxiety.* (25. anniversary ed.) San Francisco: Jossey-Bass Publishers. 2000;.
7. Chappell K, Hetherington L, Keene HR, Wren H, Alexopoulos A, Ben-Horin O et al. Dialogue and materiality/embodiment in science|arts creative pedagogy: their role and manifestation. *Thinking Skills Creativity.* 2019;31:296-322;Available from: <https://doi.org/10.1016/j.tsc.2018.12.008>.
8. Roberts A, Cantu DV. Applying STEM instructional strategies to design and technology curriculum. *STEM education & professional studies, Old Dominion University.* 2012;.
9. Burrows A, Slater T. A proposed integrated STEM framework for contemporary teacher preparation. *Teach Educ Pract.* 2015;28:318-30;.
10. El-Deghaidy H, Mansour N. Science teachers' perceptions of STEM education: possibilities and challenges. *Int J Learn Teach.* 2015;1(1):51-4;Available from: <https://doi.org/10.18178/ijlt.1.1.51-54>.
11. Knoell CM. The role of the student-teacher relationship in the lives of fifth graders: A mixed methods analysis. *Public Access Theses Diss Coll Educ Hum Sci.* 2012;134;.
12. Margot KC, Kettler T. Teachers' perception of STEM integration and education: a systematic literature review. *IJ STEM Ed.* 2019;6(1):2;Available from: <https://doi.org/10.1186/s40594-018-0151-2>.
13. Roberts T, Jackson C, Mohr-Schroeder MJ, Bush SB, Maiorca C, Cavalcanti M et al. Students' perceptions of STEM learning after participating in a summer informal learning experience. *Int J STEM Educ.* 2018;5(1):35;PMID: 30631725. Available from: <https://doi.org/10.1186/s40594-018-0133-4>.
14. Creswell JW. *Educational research: planning, conducting, and evaluating quantitative and qualitative research.* 4th ed. Boston: Pearson; 2012;.
15. Bassey M. *Case study research in educational settings.* Buckingham: Open University Press; 1999;.



16. Mackey A, Gass SM. Second language research: methodology and Design. Lawrence Erlbaum Associates Publishers; 2005;.
17. Robson C. Real world research: A resource for social scientists and practitioner-researchers. 2nd ed. Oxford: Blackwell Publishing Ltd; 2002;.
18. Stohlmann M. Consideration for teaching intergrated STEM education. J Pre-College Eng Educ. 2012;2(1):28-34;Available from: <https://doi.org/10.5703/1288284314653>.
19. Mizzi D. The challenges faced by science teachers when teaching outside their specific science specialism. Acta Didact Naocensia. 2013;6:44-6;.

# Ứng dụng của việc dạy học STEAM: Một nghiên cứu tình huống về quan điểm và việc ứng dụng giảng dạy STEAM của giáo viên tại các trường trung học cơ sở trên địa bàn Thành Phố Hồ Chí Minh

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## TÓM TẮT

Với sự mở rộng của các trường khoa học, công nghệ, kỹ thuật, nghệ thuật và toán (STEAM) trên khắp Việt Nam và thế giới, các vai trò mới của giáo viên đang được tạo ra và với những vai trò này, bản sắc ngày càng phát triển. Tuy nhiên, những vai trò này vẫn là một lĩnh vực chưa được xác định rõ ràng trong STEAM. Mục đích của bài viết này là khám phá niềm tin và việc thực hành giảng dạy của giáo viên STEAM tại trường trung học cơ sở ở TPHCM, bao gồm trả lời hai câu hỏi nghiên cứu: (1) Niềm tin của giáo viên đối với việc áp dụng STEAM trong giảng dạy là gì? (2) Các giáo viên thực hành áp dụng STEAM trong giảng dạy như thế nào?

Một thiết kế nghiên cứu điển hình đã được sử dụng để khám phá các câu hỏi nghiên cứu trong bối cảnh giảng dạy STEAM tại hai trường trung học cơ sở tại TPHCM. Dữ liệu cho nghiên cứu này được rút ra từ các cuộc phỏng vấn bán cấu trúc được thực hiện với sáu giáo viên từ hai trường THCS.

Kết quả: Sử dụng quy trình phân tích dữ liệu quy nạp, hai chủ đề chính đặc trưng cho thực tiễn và niềm tin của giáo viên STEAM đối với việc giảng dạy STEAM.

Kết luận: Nghiên cứu này kết luận rằng thực hành và niềm tin của giáo viên STEAM có thể được xem như là một quá trình rất năng động, sáng tạo và ngày càng phát triển. Sự nỗ lực của giáo viên trong việc đem lại những bài học đầy thú vị về STEAM đã gây sự hứng thú, tò mò và kích thích sự ham học hỏi từ học sinh. Sự phù hợp giữa niềm tin và việc thực hành giảng dạy cũng như hiểu biết về STEAM của giáo viên là điều cần thiết để giảng dạy STEAM thành công trong các trường trung học trên địa bàn TPHCM.

**Từ khóa:** Trường học dạy STEAM, Nghiên cứu tình huống, giáo viên STEAM

Trường Đại học FPT

Liên hệ

Hồ Trúc Chi, Trường Đại học FPT

Email: chiht7@fpt.edu.vn

Lịch sử

- Ngày nhận: 05-08-2022
- Ngày chấp nhận: 02-02-2023
- Ngày đăng: 12-2-2023

DOI: 10.32508/stdjssh.v6iS1.796



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Bản quyền

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Trích dẫn bài báo này: Chi H T. Ứng dụng của việc dạy học STEAM: Một nghiên cứu tình huống về quan điểm và việc ứng dụng giảng dạy STEAM của giáo viên tại các trường trung học cơ sở trên địa bàn Thành Phố Hồ Chí Minh. *Sci. Tech. Dev. J. - Soc. Sci. Hum.*; 2023, 6(S1):42-51.