

The Ability of Teachers at Tuyen Quang Province's Primary School to Organize STEM Educational Activities

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Abstract

The effectiveness of students' learning is significantly impacted by primary teachers' capacity to plan STEM instructional activities. If the study reveals the precise state of the teachers' capacity to plan STEM education activities in selected primary schools in Tuyen Quang Province. It will serve as the foundation for initiatives that will increase teachers' ability to plan STEM educational activities and improve the standard of instruction in primary schools. 210 administrators, teachers, and 350 students from 7 primary schools in Tuyen Quang Province were interviewed in-depth using analysis and synthesis of theoretical approaches, questionnaire surveys mixed with observation, and in-depth interviews. We have got preliminary results on the level of teachers' attainment of the capacity to plan STEM educational activities using quantitative data processing techniques on SPSS software. The competencies are often evaluated at an average to slightly above average level. Based on the aforementioned research findings, we offer some suggestions for managers to take into account when developing a strategic plan to enhance teachers' ability to plan STEM-related educational activities.

Keywords:

STEM, STEM education, organizing educational activities, STEM proficiency, primary school, Tuyen Quang.

1. INTRODUCTION

In Directive 16/CT-TTg dated 4/5/2017 of the Prime Minister stated:

The basis of global production is changing due to the fourth industrial revolution, which is based on a development trend built on a highly integrated foundation of the digitalization, physics, and biology link system. A STEM education pilot initiative has been launched by the Ministry of Education and Training in collaboration with the British Council for a number of secondary schools in a number of provinces and cities. The Ministry of Education and Training also included STEM education in its directives for the 2014–2015 academic year, and it has since continued to urge communities all around the nation to incorporate STEM into the process. incorporation of the relevant courses from the current high school curriculum. Additionally, STEM education has been incorporated into the national Departments of Education and Training's school year tasks [7] [8] [9].

"STEM education is an educational model based on an interdisciplinary approach, helping students apply science, technology, engineering, and math knowledge to solve problems," as is mentioned explicitly in the 2018 General Education Program. tackle a few practical issues in a certain situation. Therefore, STEM education is intended to enhance education in the domains of science, technology, engineering, and mathematics while exhibiting an interdisciplinary approach to development in the 2018 General Education Program [6].

STEM education is being implemented in Tuyen Quang in accordance with the Ministry of Education & Training's goal. STEM education has been established in all preschools and high schools in the province after years of trial runs at all levels. In the current period, Tuyen Quang Department of Education and Training has implemented STEM education according to the instructions in Official Letter No. 3089/BGDĐT-GDTrH dated August 14, 2020; Official Letter No. 859/SGDĐT-GDPT dated September 14, 2020 to direct schools to implement STEM education with flexible educational forms and activities suitable to school conditions such as the Morning Experience Festival Creation, STEM Festival, Extracurricular activities, competitions... [10] [11] [12]. In Report No: 76/BC-SGDĐT dated March 27, 2020 Report on the implementation of STEM education in secondary education by the Department of Education and Training of Tuyen Quang [13], there are clear difficulties and limitations: "Teachers struggle to create STEM lessons

that satisfy the three objectives of developing human characteristics and competencies as well as the information and skill requirements of the existing curricular framework. in accordance with the new general education curriculum. It is challenging to execute interdisciplinary teaching, such as STEM education, because the integrated teaching capacity of many teachers is still constrained (because the majority of teachers are trained in single topics). Additionally, there is poor coordination across subject teachers in STEM teaching since some educators are scared to learn and share with peers.

In order to overcome the gaps in knowledge and required competences, the analysis above demonstrates the need for study on the ability to plan STEM education activities for primary school teachers generally and teachers in Tuyen Quang province specifically. Create and plan STEM activities for instructors so they may methodically and scientifically integrate STEM into the new general education program. In order to determine if the province of Tuyen Quang has the ability to organize STEM education activities for teachers that satisfy the standards of the new general education program, we performed a survey.

2. RESEARCH METHODS

The study combines three categories of research techniques: Group of practical research methods; Support methods; Group of theoretical research methods.

To create a theoretical foundation for the problem of teachers' capacity to plan STEM educational activities at several primary schools in Tuyen Quang province, a group of theoretical research methodologies was used. These methods involved assessing and synthesizing literature relevant to the research topic.

Group of practical research methods:

- Observational method: This approach is used to gather data on the state of some primary schools in Tuyen Quang province's teachers' ability to plan educational activities.
- Questionnaire-based survey method: To ascertain the current state of the ability of teachers to plan educational activities at selected primary schools in Tuyen Quang province.
- Technique for summarizing the experience: To generalize and arrange the practical concerns regarding the ability of teachers to plan educational activities at several primary schools in Tuyen Quang province.
- Expert method: Inquiring about managers' and veteran instructors' thoughts who are involved in the STEM teaching process.

Group techniques for applying statistical math: encoding and processing topical data using statistical processes. During the examination of the real-world problem, data were analyzed and processed using mathematical formulas and SPSS 20.0 software. Relevant charts and diagrams were created.

3. RESEARCH RESULTS

3.1. Organizing STEM-related teaching activities for elementary school teachers: some theoretical concerns

3.1.1. Concept of a Tool

a. STEM concept

STEM is believed to mean STEM education in the educational environment and on a global scale. Using the research findings of the following authors: E.H. Lim (2014) [20], Mark Uindale (2016) [21], Nguyen Van Bien (2019) [14], Nguyen Mau Duc (2017) [15], it is demonstrated that "STEM education is an interdisciplinary approach to learning in which principled academic concepts are integrated with real-world lessons, where students apply knowledge in science, technology, engineering, and math into specific contexts, helping to connect schools, communities, workplaces, and g (This is according to the National Science Teachers Association (NSTA).

In which case: Science: Is a subject that aims to increase students' capacity to employ Science knowledge (Physics, Chemistry, Biology, and Earth Science); it not only helps students understand the natural world, but it also teaches them how to solve scientific problems in everyday life.

Technology: A course that teaches students how to utilize, manage, comprehend, and assess technology. It gives students the opportunity to comprehend how technology is developed, as well as the abilities to examine the influence of new technology on students' and the community's daily lives...

Engineering: A course that teaches students about the engineering design process and how technology is created. Technology allows students to integrate information from other fields, making linked concepts visible in their daily lives. Engineering also teaches students how to creatively utilize the foundations of Science and Mathematics in the design of items, systems, and industrial processes.

Mathematics: Is a subject that teaches students how to successfully analyze, reason, and convey ideas through calculations, explanations, and solutions to mathematical issues in particular scenarios.

When compared to the present Vietnamese general education curriculum, the Science topic corresponds to Natural Science disciplines such as Physics, Chemistry, and Biology. The subjects of Technology and Engineering in the rest of the globe correlate to the subjects of Technology and Informatics in Vietnam. As a result, in the Vietnamese educational setting, STEM education will encompass the subjects Physics, Chemistry, Biology, Technology, Informatics, and Mathematics [19].

b. organizing educational activities STEM

According to Official Dispatch 2345/BGDĐT-GDTH on guidelines for developing educational plans of primary schools, specific and detailed lesson plans were developed which details the activities that students engage in while learning, such as opening activities (warm-up, connection), new knowledge formation (experience, discovery, analysis, formation of new knowledge), practice activities, practice and application activities, and applying what you have learned to find and fix problems in the real world. Depending on the goal and format of each activity, teachers may choose to organize learning activities for students individually, in groups, or as a class as a whole. Teachers should make sure that each student has the chance to complete their own learning tasks or real-world experiences. Thus, as soon as students acquire new knowledge, the integration of STEM education activities into the lesson plan of a particular subject can be carried out into practice, practice, and application activities. 9].

Therefore, in this study, we propose the following idea: *Organizing STEM educational activities is an activity where teachers provide support, reinforcement, and education in Science, Technology, Engineering, and Mathematics in Primary school aims to organize, control, and support students' cognitive processes by involving them in interactive activities with learning objects to acquire knowledge, form, and develop products. qualities, general abilities, and specific competencies.*

c. The idea that primary teachers are capable of planning STEM-related instructional activities

The term "NL" has two meanings, according to the Vietnamese Great Dictionary:

- Enough or necessary conditions for something to happen;

- The capacity to do a thing well [1; p 1172]. In order to handle the challenges presented by situations, competence is the integration of skills that naturally act on the contents in that sort of situation [2; p 91]. Author Do Huong Tra defines competence as the capacity to integrate knowledge, skills, and other psychological characteristics such as excitement, belief, and will to successfully carry out a certain task. work in a specific setting [3; p 7].

Four primary parts make up the competency framework (Dau Thi Hoa, 2018): Professional competence is the capacity to carry out professional duties and the capacity to critically and independently assess professional outputs. systematic and exact, particularly linked to cognitive and psychomotor skills that are learned via the study of specialized subject; Methodical competency is the ability to act in a planned, goal-oriented manner in solving tasks. The ability to receive, analyze, evaluate, transmit, and present knowledge - acquired through methodological learning - to solve issues is at the core of methodological competence; Social competence is the ability to achieve goals in situations of social interaction and behavior as well as in tasks requiring close coordination with other members - acquired through learning to communicate; Individual competency is the ability to identify and assess personal development opportunities as well as limitations, develop aptitudes, develop and implement personal development plans, and personal goals. points, standards of moral values and motivations that govern attitudes and behaviors - received through emotional-ethical learning and related to thinking and acting on self-responsibility [16], [22], [23].

As a result, in our opinion, primary school teachers' capacity to plan STEM educational activities is a blend of their personal traits and psychological make-up in accordance with the particular needs of a learning activity. STEM education will make sure the activity is really successful. The capacity of primary school

teachers to plan STEM educational activities is shaped by their innate abilities and requires ongoing effort and training that is continually improved and enhanced.

3.1.2.Organizing STEM educational programs by teachers' organizational skills

Vietnam's implementation of STEM education has three basic forms: lessons, hands-on activities, and scientific research (Ministry of Education and Training, 2020). In order for teachers to execute STEM-oriented instruction in the form of lessons, this study is interested in the key competences that they still lack and need to develop. There are varying views on the skills that instructors in the modern era should possess. According to Nguyen Phuong Thao (2019), instructors need to possess six competencies: readiness for the future, technological proficiency in the classroom, cooperation skills, adaptation, lifelong learning, and subject-matter expertise [25].

Teachers must have their own standards for teaching competency in addition to the general competences they require for the teaching process, each subject, each distinct educational activity, and each different teaching approach. Basically, a qualified instructor in a particular sort of activity or field should possess the following fundamental characteristics:(1) Having thorough knowledge or understanding of that type or area of activity; (2) Knowing how to carry out that activity successfully and achieve results consistent with the purpose (including defining specific goals, ways/methods to take actions/selecting appropriate solutions,... as well as the conditions and means to achieve the goal); (3) Acting with results, responding nimbly and effectively in novel and unfamiliar circumstances (Nguyen Cam Thanh, 2015). Some authors (Le Thanh Huy & Phung Viet Hai, 2019) [17] have also mentioned and divided the criteria for evaluating the capacity of teachers in integrated teaching into the following groups: (1) Competence group on integrated teaching knowledge; (2) Group of capacity to build and organize teaching; and (3) Group of capacity to evaluate students (Nguyen Cam Thanh, 2015). [24].

Additionally, research have shown that teachers fall into three categories and require a total of 15 competencies: The capacity group to plan and organize instruction as well as the capacity group to organize the assessment of students' abilities are among the teaching knowledge requirements that integrate the field of natural science (Le Thanh Huy & Phung Viet Hai, 2019). [17]. Or there is a research team that lists the following seven essential teaching competencies: According to Nguyen Cam Thanh (2015), the following skills are necessary for effective teaching: (1) the ability to plan lectures; (2) the ability to understand (assess) student capacity; (3) the knowledge and understanding of teachers; (4) the capacity for program development; (5) the ability to use teaching methods and techniques; (6) the ability to use teaching media; and (7) language proficiency. [24].

Studies have identified eight abilities, including the capacity to prepare lessons for STEM education and the capacity to coordinate instruction and educational activities. Nguyen Quang Linh, Vu Thi Thanh Yen, Duong Van Tuan, Nong Minh An, 2023) [18] discuss the following skills: program development capacity; ability to use teaching methods and techniques; ability to use teaching media; student assessment capacity; ability to design and manufacture STEM products; ability to design evaluation sheets of STEM products and activities of students.

According on published studies and the study team's experience with STEM-oriented teaching in primary schools, teachers require 16 abilities to be able to plan activities effectively. In addition to the general teaching abilities of each teacher, STEM education in primary schools includes:

Competency group to approach objects in the arrangement of STEM education activities

1. talking to students;
2. Cooperation and problem-solving in STEM activities
3. encouraging participation in STEM education initiatives from other educational areas
- group with the necessary skills to plan and coordinate STEM education in the classroom
4. The capacity to develop and produce STEM products
5. Create STEM education initiatives
6. Planning for the delivery of STEM classes
7. Create supplemental activities for STEM education
8. Using ICT and other teaching media

A group of complementary skills for the process of organizing STEM educational activities

9. Make a feasible action plan

10. Developing STEM curriculum

11. Scientific research

Assessment competency group in STEM teaching

12. Using Test in HS . assessment

13. Using other evaluation PPs

14. Using the software

Competence group to make teaching reports and recommendations

15. Writing a teaching report

16. Effective recommendations to leaders on increasing support for STEM education activities

3.2. Actual state of primary school teachers' capacity to coordinate STEM education activities in Tuyen Quang province

* A description of the inquiry and survey

- The survey's objectives were to gather relevant data to evaluate the state of STEM education in Tuyen Quang province and to help teachers build their capacity to plan STEM activities there.

- Primary school students, instructors, and administrators participated in the survey.

- The survey's topics included: the reality of primary teachers' awareness of the importance of their capacity to plan STEM-related educational activities in Tuyen Quang; the reality of their awareness of the necessity of their capacity to plan STEM-related educational activities in Tuyen Quang; and the level of their achievement in this capacity; Compare the degree of success of primary teachers in Tuyen Quang in organizing STEM educational activities; the current state of the factors impacting primary teachers' capacity to arrange STEM educational activities.

- Methods: including building information samples, exchanging, taking notes, questionnaires, questionnaires, polls, observation sheets.

- Number of surveys: 560 votes, specifically: 210 teachers, management staff, 350 students in 7 primary schools (30 teachers/school, 50 students/school). Primary schools: Chan Son elementary school (Yen Son), Phan Thiet school (city), Tan Loan school (Ham Yen), Vinh Loc school (Chiem Hoa), Chi Thiet school (Son Duong), Thuong Lam school (Lam Binh).), TH Town Na Hang.

- Survey period: from September to November 2022

3.2.1.The extent to which primary school teachers in the province of Tuyen Quang are aware of the importance of their capacity to plan STEM teaching activities

To find out the current state of awareness of administrators and teachers about the need to develop the capacity to organize STEM educational activities for teachers in primary schools in Tuyen Quang province, we have conducted a survey, the results of the study have shown in figure 1.

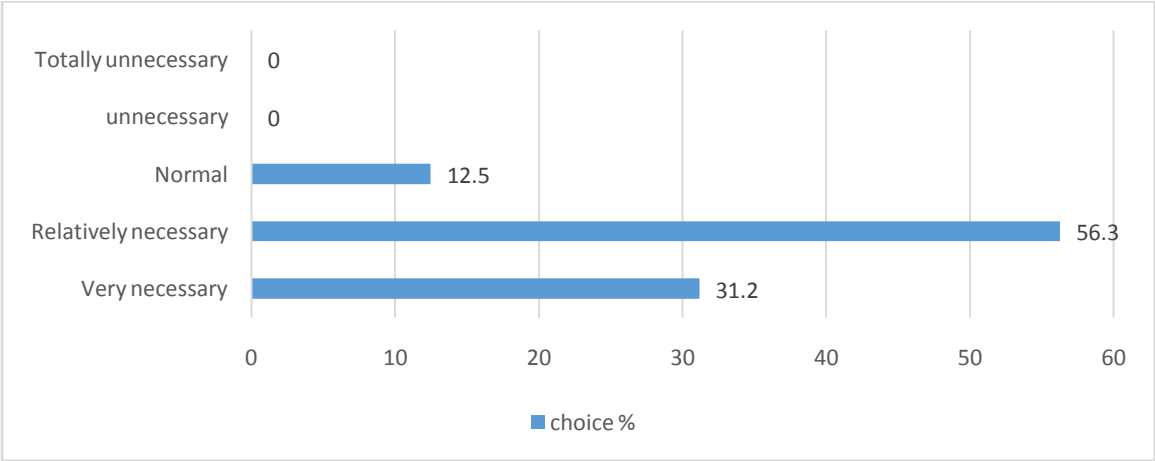


Figure 1. depicts the current state of knowledge regarding the importance of primary school teachers' capacity to plan STEM education activities in Tuyen QuangProvince.

Through the results displayed in chart 1 above, it is clear that administrators and teachers highly value the need for teachers to be able to plan STEM educational activities. Over 80% of administrators and teachers agree that STEM education is important, with 31.2% of teachers believing it to be extremely important. Only 56.3% of teachers agree that it is quite important, and only a small 12.5% believe that this is normal and there are no teachers. considered absolutely needless and not.

Teachers demonstrated their understanding of the importance of teachers to the success of the STEM program during conversations with some administrators. For STEM teachers, having the ability to plan and develop STEM instruction is crucial. Schools must make contact with institutions to arrange for teacher training in STEM subjects. in order for every teacher to comprehend what STEM is, how to choose content, and how to develop a STEM teaching topic. In order to be prepared to innovate in teaching and learning, each professional group must also support essential teachers in the STEM teaching sector.

3.2.2.The actual evaluation of the requirement for the ability to plan STEM educational activities

We asked a question that included 4 categories of competencies, each of which contains component abilities like those mentioned in the discussion above, to learn more about the real assessment of the degree of components required to plan STEM education activities.

With 16 identified competencies, we use a 5-level Likert scale (5-Very necessary, 4- Relatively necessary, 3-Normal, 2- Not necessary, 1- Completely unnecessary) . The difference between each level is (5-1): 5 = 0.8 and the levels of the scale are:

- Level 1: Assessed at a very low level of necessity (1.0 SI < 1.8)
- Level 2: Assessed at low level of necessity (1.8 SI < 2.6)
- Level 3: Assessed at average level (2.6 SI < 3.4)
- Level 4: Assessed at a relatively necessary level (3.4 average 4.2)
- Level 5: Assessed at a high level of necessity (3.4 average 5.0)

The results obtained are shown in Figure 2 below.

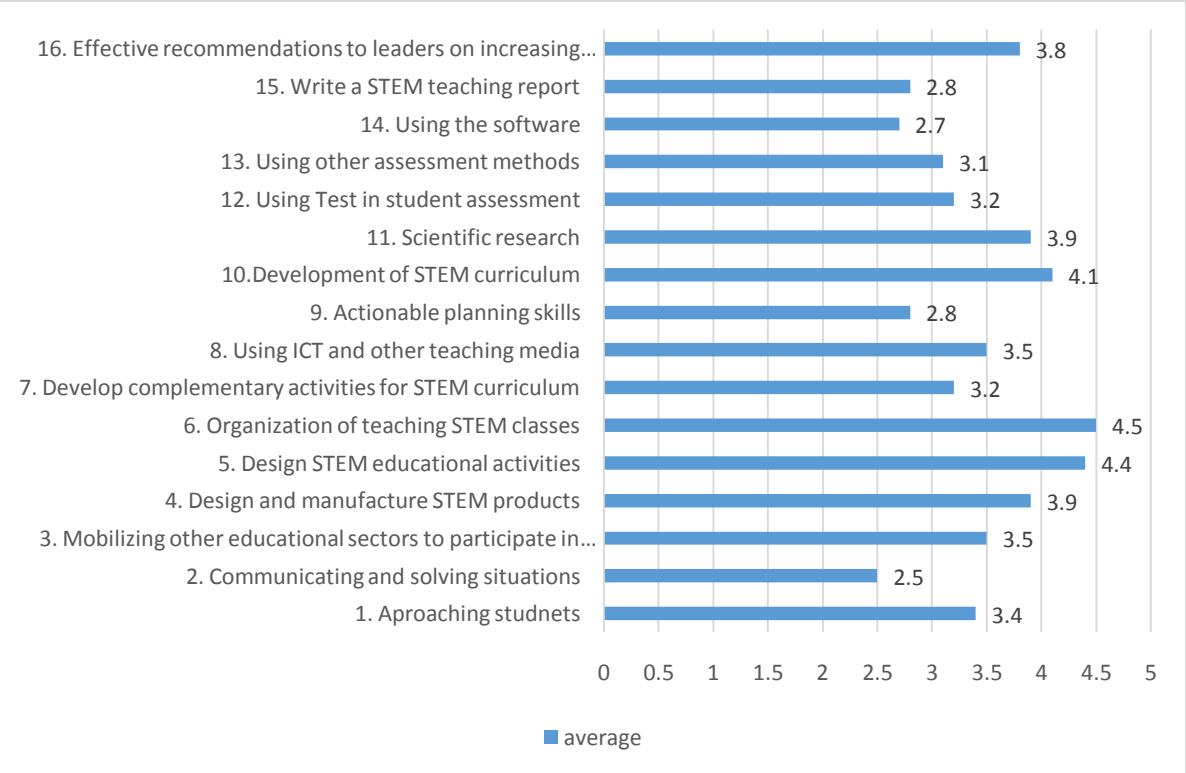


Figure 2. shows how instructors now perceive the need for the ability to plan and coordinate STEM-related instructional activities.

The results shown in figure 2 above show that in general, administrators and teachers evaluate the need for STEM education skills at a necessary and relatively necessary level. Highly appreciated skills are: Ability to organize STEM classes, design STEM educational activities (Mean = 4.4), develop STEM curriculum (Mean = 4.1), design and assessment of STEM products (Mean = 3.9)... The competencies and skills that are assessed as highly necessary are the basic competencies and skills in STEM education. Other competencies are also assessed at an average level or higher, this data shows that managers and teachers appreciate the necessity of the elements in design capacity and STEM education activities. Other competencies are also assessed at an average level or higher, this data shows that managers and teachers appreciate the necessity of the elements in design capacity and STEM education activities.

3.2.3. The degree to which primary teachers have mastered the capacity to plan STEM-related instructional activities

To clarify the current situation of primary school teachers' ability to organize STEM education activities, we have asked a survey question consisting of 4 groups of competencies and 16 component skills. The scale consists of 5 levels: Very Good (5 points), Satisfactory (4 points), Unsatisfactory (3 points), Not yet (2 points), Difficult to evaluate (1 point). The difference between each level is (5-1): 5 = 0.8 and the levels of the scale are:- Mức độ 1: Có kỹ năng ở mức độ rất thấp ($1,0 \leq \text{ĐTB} < 1,8$)

- Level 2: Skilled at a low level ($1.8 \text{ NE} < 2.6$)
- Level 3: Have skills at an average level ($2.6 \text{ DI} < 3.4$)
- Level 4: Skilled at a high level ($3.4 \text{ NE} < 4.2$)
- Level 5: Skilled at a very high level ($3.4 \leq \text{CI} \leq 5.0$).

The results obtained are shown in Figure 3 below.

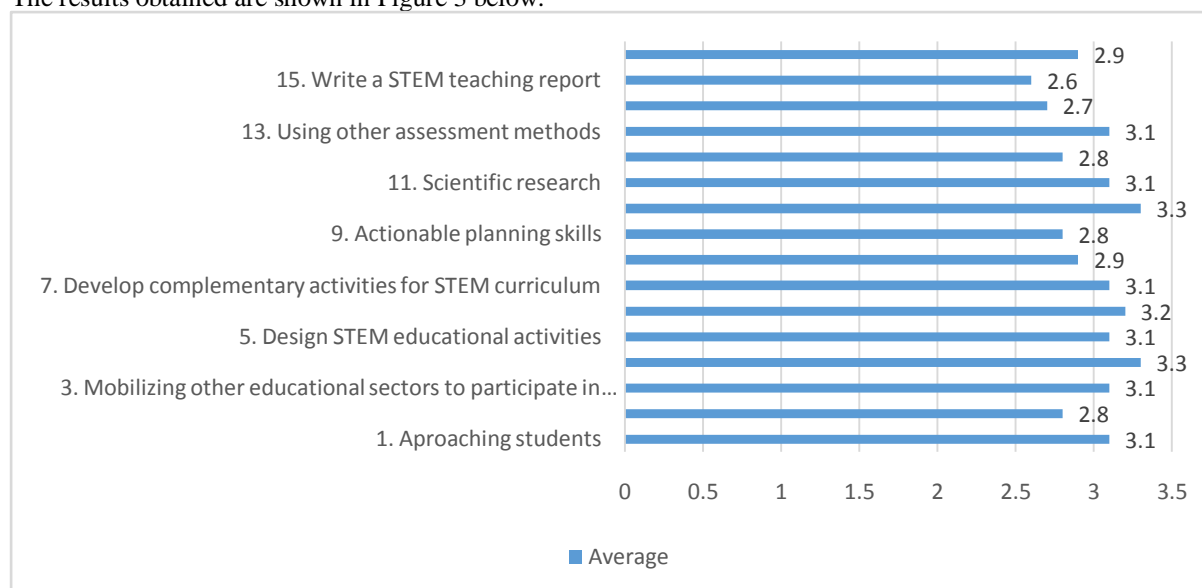


Figure 3. How primary school teachers currently fare in terms of their capacity to plan and implement STEM-related instructional activities

Through the results shown in chart 3 above, it shows that in general, the competencies are assessed at a medium and good average level. The assessed competencies ranged from 2.6 to the highest 3.3. The more appreciated competencies include: Designing and manufacturing STEM products (TBC=3.3), developing STEM curriculum (TBC=3.2), evaluating students during and after STEM lessons (TBC=3.2)... The underrated competencies such as: writing STEM teaching reports (TBC=2.6), using software (TBC=2.7), using test in assessment (TBC=2.8), planning activities is feasible (TBC=2.8)... these competencies are in the low-medium rating framework.

By combining research methodologies and integrating prior studies, we performed observations and interviews with management and teachers of the surveyed schools in order to elucidate the aforementioned scenario. Research and interview findings also indicate that new instructors (those with less than five years

of experience) value STEM competencies more highly. This outcome is also consistent with a different study that found an inverse relationship between teaching experience and how significant a teacher's "invention" is perceived to be. Another study found that teachers are less motivated to pursue a "new" career the more experienced they are; Due to their ease of learning, young instructors have an optimistic outlook and are less sceptical. Young teachers frequently enjoy participating in meetings, workshops, or networking from educational institutions related to STEM fields such as science, robotics, or mathematics. Because STEM education initially comes from extracurricular activities, they appear to be promising human resources to implement STEM education in a sustainable way.

Additionally, we observe a phenomena where teachers with advanced degrees place a larger priority on STEM education. This makes sense given that learning and retraining programs frequently provide teachers with a wealth of in-depth information, particularly information on innovative teaching methods. Previous studies have shown that teachers who take part in training and retraining programs increase their professional knowledge and teaching skills significantly. According to our poll, teachers with various specialties have quite divergent opinions about STEM education. The most relevant perceptions of STEM education and the importance placed on STEM competencies are held by teachers who specialize in teaching science or scientific-related subjects. Therefore, we believe that teacher collaboration on knowledge and instructional strategies is crucial for sustainable development.

The main challenge in enhancing knowledge beyond the specific training of each staff member is why the assessment of the aforementioned competencies is very minimal. STEM (Science, Technology, Engineering, Mathematics) integrated education is currently thought to be a combination of teaching and learning of a number of courses in the domains of Science, Technology, Engineering, and Mathematics - even including some other subjects such as English. Pedagogical schools, on the other hand, primarily focus on subject-specific teacher preparation. the necessity to "shift" from teaching one subject to a new "subject" when the lines between majors are blurred, leaving teachers perplexed about both their subject matter expertise and instructional strategies.

The research team has learned from observations, time spent in the classroom, and in-person interviews with instructors that organizing STEM experiential activities and teachers' research skills are superior to planning STEM classes. Few core teachers are capable of structuring STEM teaching at an excellent level or better. Teachers claim that there are frequently design issues with STEM courses because, based on the current program, it is challenging to select lessons that combine STEM instruction (or there are no design ideas). Teachers who participated in in-depth interviews stated that designing instructional materials for problems with practical applications is challenging because it necessitates an awareness of multidisciplinary parts of science, technology, and engineering. STEM education lessons or activities frequently have to be organized in the form of a project, requiring some periods and even taking a number of weeks for groups to implement projects. As a result, they are beyond the capabilities of teachers and students. Alternatively, the problem has a practical application but cannot come to a product is a model.

The group that represents teachers The infrastructure of the schools also places restrictions on STEM instruction; primarily, teachers must develop materials themselves or urge students to do it. Schools either lack the resources or the classrooms necessary to teach STEM subjects. In order for students to immediately see the application of gained knowledge, STEM products therefore primarily focus on designing models using repurposed materials and simulations; the product does not combine technology features.

Additionally, instructors currently do not coordinate their efforts to integrate STEM. The research team discovered through interviews that there are still a variety of viewpoints on the educational models for STEM that are used in course programs because of the various interpretations and beliefs that might be attached to the idea of STEM education. Moreover, instructors' roles are crucial for the successful implementation of STEM education. The teaching staff will directly choose the subject matter and instructional tactics, as well as develop plans for putting lessons into practice in each unique situation in order to achieve the learning objectives.

3.2.4.evaluating the degree to which instructors in select elementary schools in Tuyen Quang province are capable of planning STEM-related educational activities

In this study, we conducted a comparison on the capacity of organizing STEM education activities among teachers of the surveyed schools, including: Chan Son Primary School (Yen Son), Phan Thiet Primary School (Tuyen Quan City), Tan Loan Primary School (Ham Yen), Vinh Loc Primary School (Chiem Hoa), Chi Thiet Primary School (Son Duong), Thuong Lam Primary School (Lam Binh), Na Hang Town Primary School. The obtained results are shown in the following chart:

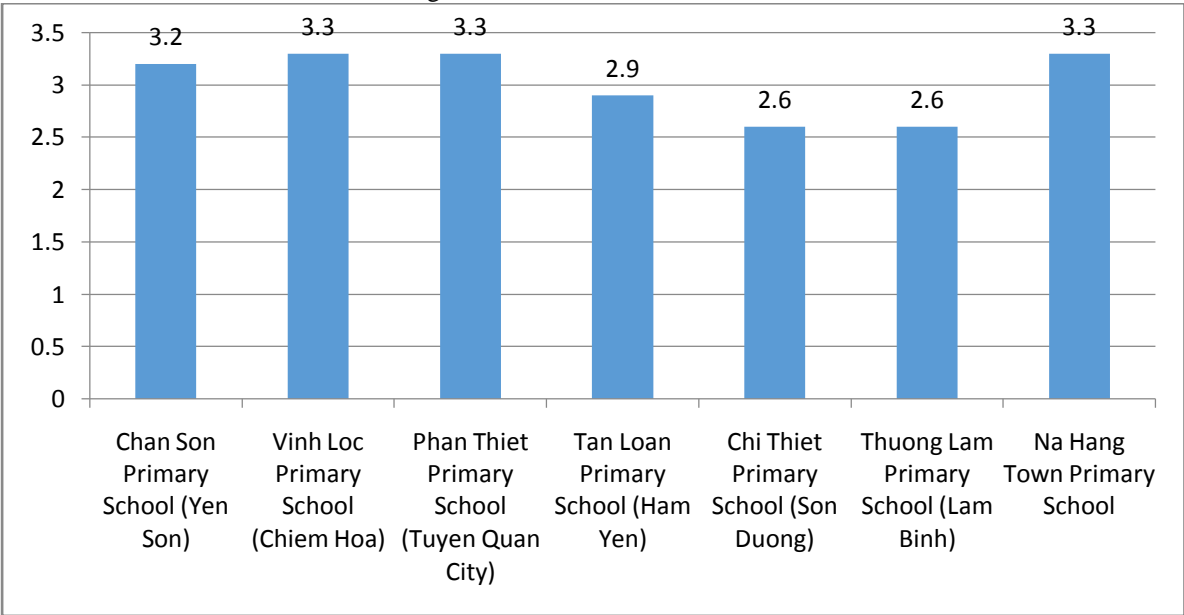


Figure4.evaluating the degree to which instructors in select elementary schools in Tuyen Quang province are capable of planning STEM-related educational activities

The results show that the level of achievement in the capacity of schools to organize STEM educational activities is at different levels: schools with good capacity include: Phan Thiet Primary School (3.4). Middle schools include: Vinh Loc Primary School (Chiem Hoa: 3.3), Chan Son Primary School (3.2), Na Hang Town Primary School (3.3), Tan Loan Primary School (Ham Yen: 2.9).), Chi Thiet Primary School (2.6), Thuong Lam Primary School (2.6). Thus, from the above results, it is shown that in general, schools located in localities have better economic, cultural and social development such as Phan Thiet Primary School (Tuyen Quang City), primary schools in Townships such as Vinh Loc and Na Hang have a higher level of capacity attainment than schools in remote areas with difficult economic conditions.

3.2.5. Actual state of factors influencing primary school teachers' ability to plan STEM-related instructional activities

In order to clarify the factors affecting the capacity of primary school teachers to organize STEM educational activities, we set up a survey question. The scale consists of 5 levels: Very influential (5 points), Very influential (4 points), Influential (3 points), Little influence (2 points), No influence (1 point). The difference between each level is (5-1): $5 - 1 = 0.8$ and the levels of the scale are:

- Level 1: Very low effect ($1.0 < CI < 1.8$)
- Level 2: Low-level effect ($1.8 < SI < 2.6$)
- Level 3: Moderate effect ($2.6 < SI < 3.4$)
- Level 4: High degree of influence (3.4 average 4.2)
- Level 5: The influence is very high ($3.4 \leq \text{average} \leq 5.0$).

The results obtained are shown in the chart below:

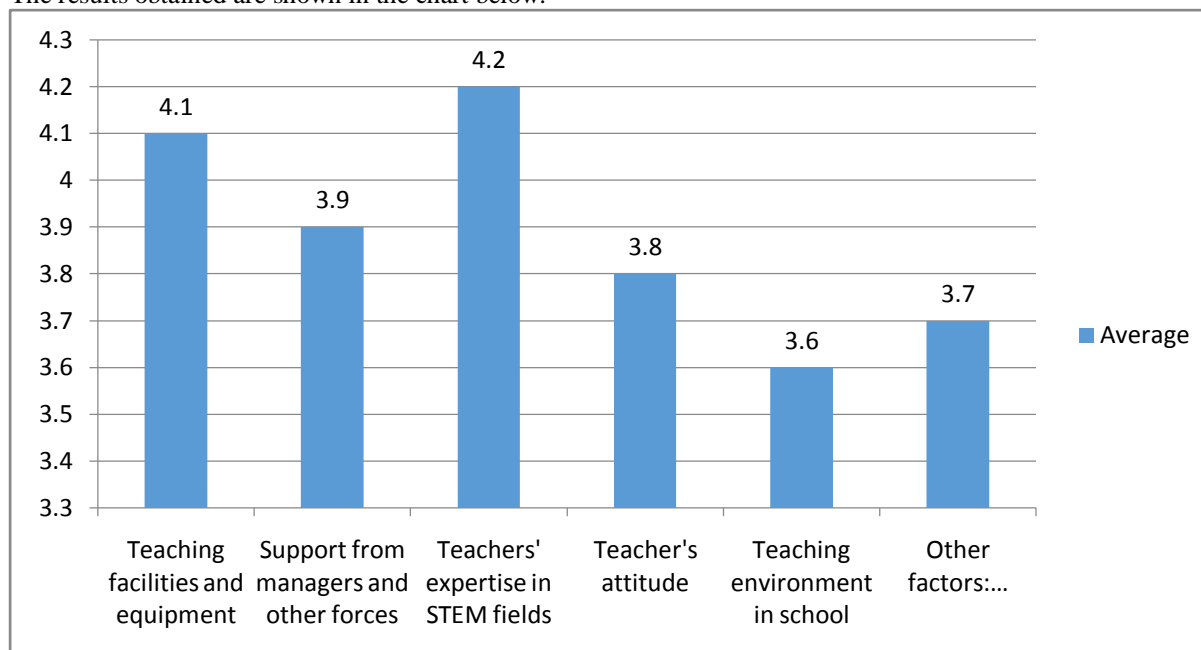


Figure5.the challenges primary teachers face when planning STEM-related lessons

The aforementioned findings demonstrate that a variety of factors influence primary school teachers' ability to plan STEM-related teaching activities. where the impacting element is most significant: Facilities and instructional tools (Mean: 4.1); Support from management personnel and other forces (Mean: 3.9); Teachers' professional knowledge of STEM disciplines (Mean: 4.2). Teachers' attitudes, the school's instructional environment, and other variables all have a moderate impact. We have direct conversations with some managers and teachers to understand the reality of the influencing elements, and the findings indicate that: The ideas that most instructors feel the necessity to have knowledge and skills in order to organize STEM educational activities have a significant impact on professional knowledge and facility considerations. Additionally, it takes a lot of time and effort to prepare STEM classes, and it is still difficult to create STEM instructional activities. The percentage of teachers who struggle to plan STEM educational activities is lower due to lack of time for preparation, poor facilities, and lack of process and technique knowledge. strategies and structures for organizing experiential learning...The teachers added that it is crucial that the physical surroundings do not fulfill the standards established for implementing STEM instruction. Additionally, having too many courses in a class makes it harder to plan activities and prevents teachers from using cutting-edge teaching techniques. Another challenge is the lack of a STEM classroom or practice space for students to do group projects, research, and experiments. Additionally, a bigger investment is needed for subjects that demand more in-depth understanding, like computer science, robotics, and programming.

4. CONCLUSION

The survey results on the current state of STEM education and capacity development for arranging STEM education activities for high school teachers demonstrate management' and teachers' awareness of STEM education and concerns. The evaluation of the function, meaning, and advantages of STEM education for our pupils has produced very favorable results. Managers and teachers have a pretty good and complete comprehension of STEM education, as well as an excellent, high, and very high appraisal of STEM education's purpose, significance, and benefits for students.

However, some teachers continue to have insufficient STEM awareness, as evidenced by some STEM education contents that are still quite unfamiliar to teachers, such as: STEM Festival, STEM Career, STEM Human Resources, because teachers have little or no access to these concepts in the training materials. This is also a reminder to the research team, who are in the process of developing training materials that will include these elements. There aren't many instructors who are investigating and directly

teaching STEM, with the majority of them focused on teachers who teach traditional STEM courses like Math, Physics, Chemistry, and Biology. Informatics, Technology... are taught by a small number of teachers. Most teachers who teach Literature, History, Geography, History, and so on have little interest in STEM education and have not employed it in their classrooms, despite the fact that STEM education may be used in all of these topics. This is likewise a problem that requires further investigation in order to find solutions.

At a medium and low level, teachers' ability to plan and coordinate lessons is evaluated; at a high level, young educators who specialize in STEM fields are targeted for assessment. However, it's also important to realize that STEM education applies to all disciplines at all grade levels, from preschool to high school, Middle School to High School, and goes beyond the fields of mathematics, physics, chemistry, technology, and informatics.

There are many factors affecting the capacity of teachers to organize STEM educational activities, the most influential factor is: Professional knowledge related to STEM fields of teachers; Elements of facilities and teaching equipment; Support from management staff and other forces.

The research findings on the current state of the ability to plan STEM education activities discussed above will serve as the foundation for educational managers to draw upon when formulating policies to increase the ability to plan educational activities. STEM training for educators will raise the standard of STEM-related activities for high school students.

V. ACKNOWLEDGEMENTS

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