

December 2019

## STEAM Education Initiatives in Nepal

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### Recommended Citation

Belbase, Shashidhar (2019) "STEAM Education Initiatives in Nepal," *The STEAM Journal*: Vol. 4: Iss. 1, Article 7. DOI: 10.5642/steam.20190401.07  
Available at: <https://scholarship.claremont.edu/steam/vol4/iss1/7>

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STEAM is a bi-annual journal published by the Claremont Colleges Library | ISSN 2327-2074 | <http://scholarship.claremont.edu/steam>

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## STEAM Education Initiatives in Nepal

### Abstract

The purpose of this paper is to highlight the status of STEAM education in Nepal. I conducted a literature review focusing on document analysis for generating themes/categories of STEAM initiatives in Nepal from various sources such as websites, brochures, reports, and government publications. The major themes emerged from the analysis of documents were-- focus on integrated education, STEAM projects, STEAM-challenge, awareness to STEAM education, and academic program in STEAM education. I discussed the challenges of STEAM education followed by the conclusion.

### Keywords

STEAM initiative, transformative education, integrated education, STEAM in Nepal

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## **STEAM Education Initiatives in Nepal**

Shashidhar Belbase

### **Introduction**

First, I introduced the general meaning of STEAM Education followed by purpose and research question. Second, I briefly outlined the method of this study. Third, I presented the major themes as the results of the study. Finally, I discussed some challenges and concluded the paper.

Some education scholars are in favor of curriculum differentiation and others are in favor of curriculum integration. Differentiation and integration are common phenomena in education, especially in school education throughout the world (Tyler, 1992). However, the current move of STEAM education has come from the scholars who not only favor the integrated curriculum, but they view that it has been a necessary move for meaningful teaching and learning in schools (Beane, 1997; Stroud & Baines, 2019). STEAM education has now gained its popularity as an education movement at different parts of the world (Liao, 2019) that originated from STEM initiative and a recent addition of the arts (A) in it. Therefore, STEAM as an acronym stands for science, technology, engineering, art, and mathematics, however, it is not just an acronym, but it is a transformative curricular and pedagogical approach (Mehta et al., 2019). Nepal is in the process of transforming school education by reforming curricula, textbooks, and education policy for more integrated education at the basic level and transdisciplinary relations at the higher level. The curriculum framework or individual disciplinary curricula do not mention STEM or STEAM, but the intent of such a paradigm shift has been reflected on documents (CDC, 2007). In this context, the purpose of this study is to explore the status of the STEAM initiative in Nepal. The research question that guided this study to achieve the purpose was: What is the status of STEAM education in Nepal?

### **Method of Study**

I reviewed the relevant literature and conducted document analysis for this study (Bowen, 2009). I googled 'STEAM Education in Nepal' to find what is going on about STEAM education in Nepal. This web search gave me only five weblinks. One of the links was associated with a Youtube audio of Friends of School, a program of Kantipur Radio. In this audio, two graduate

students talk about STEAM education initiated by Kathmandu University. The other weblinks were not worthy of review because they were not related to the scholarly discussion of STEAM. Then, I changed the search phrase with “STEAM Initiative in Nepal”. This time, I found more information about STEAM initiatives in Nepal. One of them was ‘Bhabishya National STEAM Camp 2018’ with a brief description of the STEAM camp organized in Kathmandu. Similarly, there were other few web links that were related to the STEAM initiative by Kathmandu University and a few schools in Nepal. I thematized the pieces of information from the relevant weblinks to discuss the major themes in relation to STEAM education initiative in Nepal. While doing this, I applied a method of categorical thinking to organize the themes into related categories (Freeman, 2017).

## **Results and Discussion**

### **Focus on Integrated Education**

The National Curriculum Framework of Nepal (2007) emphasized an integrated curriculum and practice at school level in Nepal. This framework emphasized integrated curriculum for grades one-three (CDC Nepal, 2007). According to this guideline, the Curriculum Development Center (CDC) of Nepal has introduced integrated curriculum and textbooks for grades one through three by integrating language, mathematics, creative arts, social studies, and local need-based education. Likewise, the document spells out its priority for integrated curriculum development for all grade levels. The curriculum integration for basic level has been divided into two phases, phase-I for grades one, two, and three and phase-II for grades four and five.

The objectives of the first phase of curriculum integration are related to formal education in basic literacy, mathematics, life-skills, and habit of personal health and hygiene. It also provides an opportunity for children to learn in their mother language. The objectives of the second phase are to develop students’ knowledge, skills, and attitudes through the integrated curriculum without subject-wise division. The learning areas include math, arts, science, physical education and health, social studies, and language. The textbooks and curricula are suggested to be a combination of all the disciplines mentioned above. This effort shows Nepal’s commitment in integrated education, may it be STEM or STEAM or other acronyms but intends to include all the subjects together.

### **STEAM Project in Nepal**

A team of young college students, who were first-year engineering students, from Australia visited Gorkha district of Nepal under a program sponsored by The Engineers Without Border (EWB) Challenge. Within this program, the students had opportunities to learn about Nepalese culture and understand the different norms and values of the mountain culture. It was undoubtedly an exciting time for the participating students in terms of their contribution to the change they intended to make in a remote village. Their goal was to transform engineering sector through the first-hand experience in remote areas in community service and development and by gaining the required knowledge, skills, attitudes, values, and experience for sustainable development (Connor et al., 2015). The program objective was dual-- one was to help students integrate engineering with a real-world problem and the other was to community development through place-based problem-solving (Connor et al., 2015). The team of students selected one of the four areas-- water supply and sanitation; energy and waste management; housing and construction; and information and communication (Connor et al., 2015). At the end of the project period, each group presented their design solutions in their respective areas considering the village Sadhikhola as a case study. The project was an example in integrated STEAM education that was directly linked with the community development by integration of rural humanitarian engineering with community issues or problems. This case demonstrates a possibility for international students and institutions to visit Nepal for community-based STEAM education through study abroad programs.

### **STEAM Challenge**

I was searching for some information about STEAM education in Nepal. I googled the phrase 'STEAM Education in Nepal' and found Bhavishya 2017. This was claimed as a first STEAM challenge program for school-level that was held at Lagankhel. The program was organised by the Ministry of Education, Science and Technology in collaboration with Robotics Association of Nepal, Nepal Academy of Science and Technology, BeeCreative, Karkhana, and Nepal Innovation Lab. There were one hundred and eighty teams from schools who participated in the challenge program with STEAM related demonstrations and models (Kathmandu Post, 2018). The collaboration among the government and non-government institutions opened up a new possibility for promoting STEAM education in Nepal that aims to develop creativity, imagination,

innovation, scientific thinking, and problem-solving skills beyond the disciplinary boundary of subject-wise teaching and learning of math, science, and the arts (Kathmandu Post, 2018). Such challenge programs are mostly limited to the capital Kathmandu, however, the successful implementation of Bhabishya 2017 demonstrates a commitment and prospect for integrated STEAM initiatives in schools in Nepal.

### **Awareness to STEAM Education**

In another news article published in Nepali Times on December 14, 2018 highlighted some features of STEAM education in terms of students' creativity through a hands-on activity that does not require expensive materials and equipment. The article author also highlighted that the use of simple materials such as paper cups and other low-cost materials could be utilized to motivate students toward design and arts integrated with math and science. Students should prepare for their future career with skills in math, science, technology, engineering, and arts (Kandel, 2018). When students make simple things such as a toy robot or electric vehicle, then they are learning multiple things such as force, energy, transformation, interconnection, and modeling with the arts and designs. Integrating different disciplines together in STEAM education may encourage students to enhance four basic skills-- creativity, collaboration, critical thinking, and communication that are fundamental for the 21st-century job market (Kandel, 2018).

Some tech-enthusiastic youths started a private venture Karkhana to promote creativity and innovation in school level students. They organized Bhabishya National STEAM camp for school level students in Kathmandu from September 27 to 28, 2018 in which the participants presented different projects that they constructed within a given time frame on the spot. These projects integrated students' knowledge and skills in STEAM subjects in teamwork. The teams had to build a prototype or model to solve local community problems (Karkhana, 2018). The reports by news articles such as Kandel (2018) and website information such as Karkhana (2018) help people be aware of STEAM education in general and STEAM initiatives in Nepal in particular.

### **Academic Degree in STEAM Education**

A formal STEAM program was first launched by Kathmandu University School of Education (KUSOED) with M.Phil. in STEAM Education since spring 2019 with an aim to help its graduates to identify research issues in math, science, technology, engineering, and the arts in

an integrated way. The program focuses on knowledge, skills, and attitudes to develop STEAM based research design with an understanding of problems and issues at the local, regional, and international level (KUSOED, 2019). The program offers some STEAM related courses--reflective practice in STEAM Education, lenses of STEAM Education, Teaching and Learning in STEAM Education, and Curricula in STEAM Education. Other courses are general education and research methods courses that are common to other M.Phil. programs. The entry requirement for the program is a master's degree in any STEM field (KUSOED, 2019).

The STEAM education at KUSOED provides the program scholars four lenses--autobiographical, pedagogical, socio-political, and philosophical to identify different roles in potential issues that society is facing in terms of economic, environmental and sustainable development (KUSOED, 2018). They develop ethical, mindful, and resilient research and development skills with reflective practice through different but interconnected methods of knowing or constructing knowledge. Such knowledge and practice require a sound and balanced curricula as a means to connect theory with practice informing each other. Such curricula can be fruitful within an eclectic inquiry-based pedagogical design, thinking, and practice. Hence, the four STEAM education courses offered at KUSOED provide some theoretical, philosophical, pedagogical and practical knowledge, skills, attitudes, and habits of scholarship through both scholarly discussions and presentations in a community of practice and research (KUSOED, 2018). Although, currently, it is limited to a small number of participants (< 20), the academic program at the research level has some merits to develop a STEAM curriculum, pedagogy and potential research in collaboration with other colleges and departments.

### **Challenges of STEAM Education**

STEAM education is gaining its moment at different parts of the world despite the challenges due to the complexity of integration, disciplinary mindset of teachers and teacher educators, and resource constraints. These challenges also prevail in the context of STEAM education in Nepal. STEAM education is a transdisciplinary approach to teaching and learning of math, science, engineering, art, and technology. Each of these disciplines is guided by their own principles, methods, and philosophical-epistemological standpoints. Therefore, the differences in nature and process of knowing across the disciplines are reflected in the curriculum integration plans, policies, and actions. The critics of STEAM education view that there are issues of

sustainability of the STEAM curriculum because teachers are not prepared to cope with the changes (Kim & Bolger, 2016). The schoolteachers in Nepal are not aware of STEM/STEAM initiatives except a few who are located in the capital city of Kathmandu. For many teachers, it may deter the disciplinary knowledge and skills due to detour across weak curricular links (Rabalais, 2014). Also, some believe that a notion of well-rounded education dilutes the focused knowledge of STEM field (Constantino, 2017). When there is a focus on each component discipline in STEAM, there is a possibility that may cause a lack of depth and rigor of the discipline in STEAM learning (Liao, 2016). There is still confusion about the model of STEAM learning and curriculum (Falls, 2019). These challenges are equally valid in the context of Nepal too. The current STEAM initiative by Robotic Association of Nepal, Karkhana, and a limited number of schools and educational institutions are facing challenges to reach a wider community across the country.

### **Conclusion**

STEAM education has been gaining its momentum at different parts of the world, for example, the US, South Korea, Singapore, Australia to name a few countries. Nepal has just stepped on this path with some private, non-government organizations, and a university. There is a severe lack of study on STEAM education in Nepal despite these initiatives. Nepal can be a good place for international STEAM experience through community-based projects in collaboration of schools and universities in Nepal. The awareness of STEAM education is at the preliminary level. There is no government initiative to promote STEAM education in Nepal although the National Curriculum Framework for School Education in Nepal mentions integrated teaching and learning across all grade levels and has suggested integrated curriculum and textbooks for grades one-three, which has been recently implemented in all public schools across the country. This initiative, in fact, hints toward STEAM curriculum, though the document does not make it explicit.



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