

# SCHOOL LEADER'S PERCEPTIONS ABOUT STEAM EDUCATION TO DEVELOP STEAM SCHOOLS IN PAKISTAN

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**ABSTRACT**— The purpose of this study is to gain an understanding of the School leaders' perception about STEAM education to develop STEAM schools in Karachi. This study unveils the background information, aims, scope, objectives and researcher's interest in selecting the topic for research. This study was conducted with three school leaders working in private STEAM schools in Karachi. Qualitative research design was used to conduct the study about the perception of School leaders who have implemented STEAM Education in schools. Data was collected from three STEAM schools in Karachi. Semi-structured interviews were used to collect the data which were design to explore the perceptions of School leaders about STEAM education. This study aimed to have better understanding about leaders' own experiences, their preferred teaching style, their vision of STEAM instruction, and their practices feedback at school level. Data was coded and categorized into themes by thematic analysis technique to analyze the data. This study identified that knowledge about STEAM education, Perceived importance of STEAM Education, Integration of STEAM education, Practices of STEAM education and future perspectives of STEAM education are the main factors to develop STEAM schools in Pakistan. Findings of the study revealed that school leader should have background knowledge about STEAM education. School leaders should devise some activities at initial level and align traditional subjects with STEAM subjects in order to integrate STEAM in school. Professional development training for teachers is needed to practice STEAM in classes. School leader emphasized on importance of STEAM education that STEAM prepares students for the world beyond and develop 21<sup>st</sup> century skills. School leaders believed that students studied in STEAM schools successfully pursue their careers in the field of science and Technology. This study also has some limitations and discusses some recommendation for the implementation of STEAM education in Schools.

**Keywords**— STEAM education, Perceptions of school leader, STEAM schools.

## I. INTRODUCTION

The constitutive definition is STEM education is the field of study comprises of STEM fields like mathematics, computer science, engineering with physical and life sciences. (Langdon et al., 2011, p. 2). Sanders (2009) stated that STEM classes have woven science, technology, engineering and mathematics with integrated field of study. In contrast to this, STEAM education is an educational apparatus that studies various educational changes beyond the subjects like science and arts. (Kim, 2019). STEAM (science Technology engineering Art and Mathematics) is an extension of Science Technology Engineering and Mathematics by an addition of Art. This was done by inculcating Art with science through visual information consisting of texts,

images and others. STEAM education is an method to learning that uses Science, Technology, Engineering, arts and mathematics as source of guidance for students towards dialogue, inquiry and critical thinking. (Susan, 2017). Some researchers identified that STEAM is used to specify arts and arts practices engage with STEM subjects (Gray, 2017). Now a days, the demand of STEAM education is increasing day by day worldwide. STEAM education becomes the means of recruitment in this 21<sup>st</sup> century. Integrating STEAM education schools is an approach to prepare a 21<sup>st</sup> century skilled workforce and literate citizen for highly technology-based society (Kelley & Knowles, 2016). Deloitte (2015) reported in his report on IT worker of the future that creativity is a key priority and that STEM

educators need to embrace the arts in order to foster student's creative design and performance using various media. (Kim, 2014) emphasized on making trends in scientific and technical competitions to focus on STEAM education. Gray (2017) emphasized the potential of developing STEAM Education for 21st century through creative pedagogies. Researchers found that students in STEM education have more opportunities in experiential learning but they are limited to only four mentioned areas. However, our economy needs more creativity and ingenuity. For this purpose, STEAM is a way to take the assistance of STEM and integrate the principles of STEM with arts. (Yakman, 2008). In STEAM education the influence of arts subject with STEM education is apparent. STEM education. Gray (2017) revealed that inclusion of arts in STEM education is more wide ranging, making science courses more interesting through the development of interdisciplinary models of science education. Gunn (2014) stated that focus on STEAM is as important as focus on STEM subjects.

Yakman (2008) suggested that STEAM education is way to integrate reality based learning in addition with the exposure of large scale of skills and career choices. Yakman (2008) highlighted that STEAM education create advanced thinkers in the society. STEAM education is very important in a way that it prepare the students for cultural diversity and technology-driven world. Kim & Song (2013) also emphasized on the arts integration and problem solving artistic skills with STEM discipline to create a work force for the society. STEAM education enhances many factors of learning among students Identified that STEAM education enhances students' self efficacy, identity, interest, utility and persistence in learning. Kim (2014) emphasized on the need on STEAM education and found that continuous and systematic approach of STEAM education increases creativity and interest in the field of science. Today, world market are arguing on the need of more scientists with creative minds and wider scientifically literate population. Therefore, Gray (2017) uncovered richer possibilities of STEAM education. BERA review commission valued STEAM education and found that STEAM education encourages the broader understanding of

science and technology, its importance in the society and contribution to the economy. Christopher (2016) found that STEAM education engage students with cognitive tools and complex reasoning skills so that they will get involved in scientific research, discourse and debate through literature, philosophy and ethics. Gunn (2017) emphasized the global importance of arts with STEM and highlighted the learning of arts within the designated learning space in schools.

There has been a rapid progress in connecting science with arts in many schools. The drivers of STEAM education add new height to the nature of science which diverges the school science towards new pedagogies and more relevant to the needs of the 21<sup>st</sup> century skills among students. (Braund, 2019). Yakman (2008) found that that integration of STEAM school day structure allows the students to have more uniformity and exposure in all the disciplines. Kim (2014) studied the importance of STEAM education in elementary school and found a significant improvement in creativity and interest in science field among students. Christopher (2016) confirmed that new approach of science and humanities are beneficial and necessary for the schools due to demand of 21<sup>st</sup> century skills. In schools, STEAM education teach students problem solving skills, critical thinking skills, creativity in addition with it prepares students to work for the growth and progress. Gunn (2017) emphasized the global importance of arts with STEM and highlighted the teaching of arts within the designated learning space in schools. Lathan (2017) emphasized on STEAM education and argued that today's education system neither pay attention to teach students problem solving skills nor collaboration at all, so school need to change the traditional systematic rote learning to the holistic interdisciplinary approach such as STEAM.

To attain this, School leaders played an important role in STEAM education to foster student's innovative and creative abilities. Hence it is important to study how school leaders recognize the implementation of steam education in their schools. School principals play a key role in confirming every student receives a high-quality arts education as part of a complete education. In short, arts-

infused education helps you reach and inspire students and achieve meaningful results. (Connelly, 2012). To promote high quality of education, STEAM instruction requires strong leadership and advocacy because applying high quality STEAM education is challenging enough. (Weis et al., 2015). School leaders need to focus how to implement STEAM education in schools as infusion of arts into STEM is not interesting only but it's really real-world learning. (Wilson, 2019)

### 1.2 Statement of the Problem:

Research studies regarding the achievements of Mathematics and Science as compared the other countries is very low as Pakistan is trailing behind in the field of science and technology (Gurria, 2018). There is rising demand of STEAM education in schools for the students to be creative and innovative as well as strong understanding of science and technology. Keeping this view in mind, our school leaders need to understand the importance of STEAM Education in schools (Harper, 2014). The Problem identified for this study is that in Pakistan, school leaders doesn't give importance to the STEAM education in their schools. Based on my personal experience, School leaders are not implementing the shared vision and mission of STEAM education in their schools.

### 1.3 Purpose of the Study:

This study examines the perception of the school leaders about STEAM education to implement STEAM approach in classes which may potentially provide a platform for other school leaders to implement STEAM in their schools. This study also analyzes the recognition of STEAM education and defines the direction of STEAM education for private School leaders. This study will fill the gap in the literature of STEAM education in Pakistan and enhance the importance of STEAM approaches in classrooms. This research will help with a better understanding of leaders' rationale for implementing STEAM educational practices in the schools to raise student creativity and engagement.

### 1.4 Rational of the study:

Many Schools in Pakistan have not integrated technology and arts in their systems. It has been found that Pakistan being a developing country need to emphasize on

integration of science ,technology and arts in their schools.( Awan ,2017) .Malik (2016 )highlighted the challenges and barriers in intergrating STEAM in schools .Among those barriers, School management plays in integrating progams in the school.School leaders need to focus the implementaion of STEAM education in schools (Wilson,2019). As the school leader play a vital role in implementing programs in the schools, therefore their mission and vision regarding STEAM education should be highlighted. (Moon, 2020). The reason of conducting the study is to give an overview to the school leaders about the implementation of STEAM education in schools with the help of the perceptions of STEAM school leaders in implementing the STEAM education. These perceptions characterize, influence and direct the interpretation of issues surrounding the school milieu and increases the knowledge other school leaders how to implement STEAM education in schools. Another reason for conducting this study is that here is limited research regarding elements necessary for implementing the STEAM education in schools. Therefore, more to be explored about the role of leaders play in school when implementing STEAM programs in schools of Pakistan. This study helps in framing the STEAM model which includes knowing the school leader perception, their knowledge and philosophy of giving importance to the STEAM education in schools. Based on research Zimmerman (2016), there is an evidence that there is need to explore how the School leaders perceive STEAM Education in regards of instructional pedagogy and their practices. ( (Moon, 2020) found few studies have analyzed the perception of the STEAM leaders about implementing STEAM integration is Schools. That is why this study is conducted to fill the literature gap about the perception of STEAM leaders to implement STEAM education.

### 1.5 Objectives of the study:

The aim of the study is to explore the perceptions of school leaders about STEAM education to implement in classes. This study also explores the guidelines to implement STEAM education in schools to foster student's engagement and creativity.

### 1.6 Significance of the study:

In order for the STEAM education rooted in the schools, it is important to know the perception of the school leader about the STEAM education and how the STEAM activities should be integrated in the schools. For this reason, the study on school leaders about the awareness of STEAM education was conducted as a basic research. This study helps the readers to understand role of school leader in generating effective methods to create an environment for STEAM activities and how the professional development is implemented in schools to promote STEAM education in schools. This study also focusses the impact of school leader to integrate STEAM education in school to foster the students` creativity and engagement for the future perspective in the global economy. This study also identifies that how school leaders perceive they impact on students` creativity by integrating STEAM education. This study also highlights the guidelines to formulate STEAM education in schools. This study will help school management to integrate STEAM activities in their schools to cater students` creativity and problem-solving skills.

### 1.7 Scope of the study:

This study will add a literature in the field of STEAM education. and how school leaders will help school to implement STEAM in classes and promote STEAM education.

## II. LITERATURE REVIEW

STEAM is an educational method to learning that uses Science, Technology, Engineering, the Arts and Mathematics as key points for guiding student creativity, exchange of ideas and critical thinking. The end results are students who take thoughtful risks, involve in experimental learning, continue in problem-solving, promote collaboration and work through the innovative process. These are the innovators, educators, leaders, and learners of the 21st century (The STEAM Portal by Education Closet, 2014). Feldman (2015) in her article emphasized on use of Arts with STEM education. She pointed out that STEAM uses project based learning and foster students` skills in collaboration, problem solving, tech ability and creativity. STEAM education forces the students to work in different way other than STEM education for those students who are not gifted with technical abilities. She examined among students that STEAM uses design method approach

towards STEM education which make them real-world relevant to all students.

The School leader has a vital role in bringing any change in the school. They are responsible for shaping a vision and mission of academic success for all students, while working with staff to improve teaching and learning in the whole process. Wiley (2018) in his paper states nine reasons to integrate STEAM education that directly involve school leaders. 1). Set the vision for school-wide STEAM integration 2). Target leaders to help bring about the change needed for integration. 3). Focus on the research and the results of other school-wide arts and technology integration programs. 4). Start small by integrating STEAM into one part of your school. 5). Build capacity of staff to deliver their potential in incorporation of STEAM 6). Encourage those who take risks around the arts integration learning process. 7). Update school-wide arts integration skeptics. 8). Provide support for teachers in integrating technology and arts into their lessons. 9). Look out for the future of your school-wide STEAM integration program. Bryce (2012) conducted a study on what arts integration could do for student engagement and creativity in an elementary school, when the leadership and teachers support a community-based arts program. Wilson (2019) investigated system leadership in relation to instructional leadership cultivates student creativity and engagement. This study involved reviewing literature and research on the topic and by interviewing New York City Department of Education high school principals and a superintendent, on the topic of the principal`s impact on arts-infused education that cultivates student creativity and engagement. The results of his research are that school leaders, perceive their impact on promoting student engagement and fostering student creativity which supports STEAM education in schools. He found that School leaders can prepare students for success in the 21st century as they prepare to enter college and industry to pursue a wide array of subjects and careers by integrating STEAM in education.

## III. METHODOLOGY

### 3.1 Research Design:

Research design is the procedure used to collect, analyze, interpret and report data in research studies (Creswell,2006). The study was done with qualitative design approach to expand and explore the research questions. According to Creswell (2006), qualitative approach is best suited when literature might generate little information about the phenomenon and needs more exploration as this study needs both exploration about implementation of STEAM education in schools as well understanding of the process of teaching STEAM in schools. This study uses the qualitative research design as this design is widely used to explore the class room experiences and activities in the schools (Creswell,2006).

### 3.2 Population and Sampling:

Three participants were interviewed through convenience purposeful sampling technique for qualitative data. They were interviewed about the implementation of STEAM education in schools as this technique is widely used in qualitative research for the phenomenon of interest to identify and select the information-rich cases. (Creswell,2006).

### 3.3 Research instruments

Qualitative research design mostly relies on the views of the participants in the study as compared to quantitative research. Interviews are widely used to collect the data in qualitative research design in which participants` beliefs, views and experiences were recorded about the specific research question (Coughlan, 2009). Data collection tool used in the study was open ended semi -interview questions which facilitates the researcher to collect more richer textured data from the participant. Open-ended questions offer participants more option in responding (Creswell,2012). Interview protocol with demographic information were also shared with the participants. The interview questions were associated with the research questions and were reviewed by the supervisor for example What is the Principal`s perception about the integration of STEAM lessons in the school curriculum? Or What are the guidelines for writing STEAM lessons for the school?

### 3.4 Data collection Procedures

This study uses qualitative research design so qualitative data regarding perceptions of Principals and STEAM leaders were

collected through open ended semi-structured interviews. Interview protocol were developed to organize and record the data. Different approaches were used to collect the information in interviews such as email, text messaging and using telephone due to the pandemic situation in city. Brief notes were also taken during the interviews. Prompts were also used by the researcher as it allows the participants to expand more and re-engage in the interview session (Robson,2002). All the interviews were recorded and then transcribed. An interview guide was prepared to conduct the interviews with the Principals and STEAM leaders. They were asked to fill a demographic questionnaire. Consent for the interview were taken verbally and in the written form also.

### 3.5 Ethical Consideration:

Merriam (2009) found that ethical issues commonly emerge during data collection and dissemination of findings in qualitative research study. The ethical consideration of this study consists of following: Protecting the status of the School leader within the STEAM school, Protection of School identity, informing all the participants about the required responsibilities of the study and reviewing the final draft of the study for any incorrect information if might be. Before data collection, informed consent form was shared with the participant. It was ensured that every participant was participating voluntarily and could leave the study at any time. Numeric codes were provided to each participant in the interview transcripts. To protect the participants of the study, symbols were used to identify the School leader such as SL1, SL2, SL3. These were used to determine the interview transcripts and other evidences in the study. School leaders were permitted to withdraw at any time during data collection as they are very busy with their job tasks.

## IV. DATA ANALYSIS & RESULTS

To analyze the data, this study used thematic analysis through coding and categorizing the data and identifying the themes. All the interviews were transcribed and were listened twice. The relevant words, sentences, and opinions were noted. Common themes were identified. Subsequently, meaningful themes were extracted to provide insights into the research question.

### 4.1 Description of the Sample:

School leaders were selected on the basis of convenience sampling method. School leaders were associated with STEAM schools of Karachi. They were contacted through email and time was arranged to conduct the interviews. The

participant understood that their participant was under volunteer basis. School Leaders were identified by using symbols SLA, SL2 and SL3. Table 1 shows the demographics of the participants:

Table 1: Demographic Information of the School Leaders:

| Participant          | Gender | Working Experience |
|----------------------|--------|--------------------|
| School leader (SL) 1 | Female | 8 years            |
| SL 2                 | Female | 4 years            |
| SL 3                 | Female | 3 years            |

## 4.2 Results:

Following are the results that were gathered through qualitative research. This study used a qualitative approach to know the perception of STEAM leaders about STEAM education and its integration for developing STEAM schools that cultivates student creativity and engagement. This research will help system leaders to understand the rationale for implementing STEAM lessons in educational practices in schools. Tables are included that will summarize each leader's data. The data is described in narrative form gathered from the responses provided by the leaders interviewed. The leaders' responses are organized by the themes that emerged. The results of the study were obtained by studying the major themes and sub themes emerged from the interview data. The major themes revealed were knowledge about STEAM education, Perceived Importance, Practices of STEAM activities and future perspectives of STEAM education.

The major themes are

### 1. Knowledge about steam education

- STEAM Leaders believe they are responsible for implementing STEAM education and impact on students' engagement and creativity.
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### 2. Practices of STEAM activities:

- Professional development and collaboration among teachers on continuous basis

### 3. Integration of STEAM Education:

- School leaders must facilitate processes and engage in activities to support STEAM education.

### 4. Perceived Importance about STEAM education

- STEAM education are the skills students need to succeed in the 21<sup>st</sup> century.
- Traditional schools are looking to align with STEAM aspect of education.

### 5. Future Perspective of STEAM education:

- Students are prepared for the world beyond school.
- Students successfully pursue their careers in the field of science, technology, engineering arts and mathematics.

## 4.3.1 Thematic Code # 1: Knowledge about STEAM Education:

The purpose of interview questions asked with the steam leaders to know their knowledge about steam education in order to engage students, enhance creativity, prepare students for the global challenges.:

### Responsible for implementing STEAM education

School leaders think that they must use their budget and resources in order to build STEAM activities in their classrooms The School leaders talk about their principals being the lead of the school and are responsible for implementing the STEAM activities in classrooms. They make sure they just hire new teachers with some engineering and arts background. All the school teachers understand that

they are educational leaders of their buildings and they can impact on students' engagement and creativity through STEAM education.

"STEAM is basically the amalgamation of Science, Technology, Engineering and Mathematics. Research shows that students who indulge in STEM learning activities are found to have great reflexes and a tendency to develop problem solving skills.

#### **Background Knowledge about STEAM model:**

Steam leader suggested that Principals who have a background with STEAM is best suited for the implementation of the STEAM education in schools. They have shared their experiences, their education related with arts and engineering, teaching STEAM and currently supervising. Constructivism learning theory (Vygotsky, 1978) stated that people learn by creating their own meaning and understanding of from their own experiences. School leaders discussed that background of the School leader, being creative also aligns with enhancing creativity among students. School leaders interviewed share the conclusion that school leaders' must have some background, experience, interest in supervising or engaging students in STEAM education.

#### **4.3.2 Thematic code #2: Practices of STEAM Education:**

The purpose of asking interview questions under this major theme is to identify the work that steam leaders implement in assuring the embedding of STEAM throughout the content areas in the school. Majority of the STEAM leaders ensure that pedagogical staff, both academic and STEAM teachers constantly collaborate to design the refined curricula for STEAM education. They also mentioned that Principal also constantly engage the teachers in ongoing professional development courses on STEAM education.

The following sub themes obtained from the interviewers

#### **Professional development and collaboration among teachers:**

The importance of professional development was discussed by most of the STEAM leaders to integrate the STEAM activities effectively. STEAM leader talks about professional development and collaboration are the key factors to assure that school curricula supports STEAM. They said that going back to professional development to make sure that

teachers have more time to collaborate with other teachers and make sure that one goal-one aim being executed in terms of us.

#### **4.3.3 Thematic Code # 3: Integration of STEAM Education:**

This theme emerges when all the teachers discussed that STEAM should be embedded in curricula of the school:

##### **Activities to support STEAM education:**

This theme emerges when all the teachers discussed that STEAM should be embedded in curricula of the school. They expressed that STEAM is a very diverse field. It has in fact become a mandatory subject in many international schools. Schools all over the world are extending STEAM learning from Mind math, science experiments to Robotics, AI, IOT, programming, games development, and so on. STEAM leader also expressed that how the activities and classes support STEAM education in schools that keep the students engaged.

#### **4.3.4 Thematic code #4: Perceived importance of STEAM Education:**

STEAM leaders know that students are competitive and they are attracted to the STEAM schools because of the curricula and courses offered. The following are the sub themes obtained from the interviews:

##### **STEAM education are the skills students need to succeed in the 21<sup>st</sup> century**

Many STEAM leaders are aware of the fact that STEAM education is constantly evolving. They understand that moving into 21<sup>st</sup> century means there must be collaboration with STEAM. This speaks the need of STEAM education. STEAM leaders shared that students need both arts and technology in order to excel in 21<sup>st</sup> century career and industry

##### **Traditional schools are looking to align with STEAM aspect of education.**

STEAM leaders emphasized the need of more STEAM school and found that most schools are integrating STEAM activities with their routine classes. They shared that to meet the 21<sup>st</sup> century standards, every school should have technical education program at school. they expressed that every school should align more digital and computer design course with other subjects.

#### **4.3.5 Thematic Code #5: Future Perspective of STEAM education:**

STEAM leaders want to know that students can survive anywhere. Standardized assessment is necessary to make the students ready for field so that they can continue their further studies and enter to their respective industry. All the STEAM leaders who were interviewed agree that students who study STEAM are career ready on different levels of their future. They confirm that these students get accepted to college on different fields of interest.

The following subthemes are emerged are as follows:

**Students are prepared for the world beyond school.**

STEAM leaders highlighted the industries they enter like arts, engineering science and technology. They discussed that what STEAM education does for the students as it engages and broadens the creativity and logical thinking. STEAM leader expressed that It is certainly evident from the fact that students who have had STEAM experience perform better in higher studies compared to students with void knowledge or experience. Therefore, they have higher probability of success in professional life. They revealed that Students who participate in STEAM training at early age develop clear vision whether they tend to incline towards technical field of engineering or non-technical field. They develop prerequisite skillset after assessing their core competence accordingly and function efficiently in professional life. Thus, they make a positive impact globally.

**Students successfully pursue their careers in the field of science, technology, engineering arts and mathematics.**

All the STEAM leaders perceive that students in STEAM school are prepared to pursue their careers in the field of science, technology. They shared that STEAM school introduced variety of things and then they get to pick and choose where their interests which are very wider and career oriented. They expressed that Students studying STEAM become familiarized with what is actually expected of them once they finished. They leave with a very thorough information of the program that they would like to pursue after school.

This analysis revealed several themes that are related to the research question. These themes are very useful as they are

guidelines for the Schools to implement STEAM in their own schools. Leaders have a noteworthy impact on the school. STEAM Leaders expressed various way that their leadership impact on students` creativity and engagement.

## V. CONCLUSION

Based on the findings it was concluded that STEAM leaders were deliberate in their expression about their implementation of STEAM education. They expressed that there is need of teachers to implement STEAM education in schools. It was found that STEAM leaders support teachers with resources and providing opportunities to participate in curriculum development of STEAM education. It was shown from the findings that all the STEAM leaders expressed that STEAM education has an impact on students` engagement and creativity. Haris (2017) during investigation of secondary schools in Australia, US, Canada and Singapore explored significant relationship between creativity and STEAM education. It was also concluded that Principal plays an important role in implementing STEAM in schools as they must have some experience of STEAM activities. Paul (2000) identifies that Principal has unique role in implementation of the guiding principles and affect the overall professional development of the teachers. It was also found that discussion of what STEAM leaders need in order to implement STEAM education was consistent across the interviews with all the participants. Research conducted by Fullan (2014) supported that Principals of the STEAM schools must possess a certain background to lead the STEAM schools effectively. It was concluded further in order to implement STEAM education in schools, professional development of teachers should be done in continuous manner. Ahn (2012) analyzed the STEAM educational fields and teacher perception in implementing STEAM education. Professional development of teachers, teachers` self-efficacy and teacher interest in STEAM education relates each other. STEAM leaders also emphasized on the collaboration among teachers that the teachers of traditional subjects should collaborate with STEAM teacher to accommodate STEAM activities in classrooms (Haris, 2017) identified that teacher collaboration ,dialogue and classroom organization fosters creativity and critical thinking through

STEAM activities. Based on the findings of the research, it was concluded that almost all the STEAM leaders advocate alignment of traditional subjects with STEAM lesson in classrooms. (Connor, 2015) found that chalk and talk pedagogical approach does not embrace the STEAM purpose in classrooms. It was concluded that STEAM leaders provided multiple examples of the students' success in college and beyond. Ruppert (2006) revealed that arts integration with other subjects open possibilities for participation in global market as well as students success in the world. It was concluded STEAM education integrates in classrooms as a separate subjects. STEAM education emphasizes in the application of knowledge in real life situations and caters project based learning. (Connor, 2015) found that ingenious learning through STEAM can transform the nation of today's into future world by preparing professionals in terms of complex problem solving skills. Based on the findings, it was revealed that STEAM education provide students' easy careers paths and enter into the global market. (Gray, 2017) expressed that STEAM careers are fun and challenging and suggested that we should embrace and understand STEAM for our success in future.

### 5.1 Limitation of the study:

The limitation in this study was small sample size i.e. three participants were taken to conduct interviews about the steps taken to implement STEAM in schools which cannot be generalized to the larger population as it is very low. There was very less time to conduct this study due to pandemic situation in a country which can lead to some scientific and methodological mistakes. Another limitation of the study was to collect data by convenient sampling technique that gave biasness on results. Another limitation was the approach to the STEAM leaders as they were busy to respond to requests outside their daily responsibilities.

### 5.2 Future Recommendations:

Following are the recommendation for the practice as well in terms of future researches:

1. It is recommended that Principals of traditional schools create STEAM activities to some level to

enhance student's creativity and problem-solving skills.

2. It is recommended that Principals should engage the staff in professional development in which courses related to STEAM education will be introduced and taught.
3. It is recommended that study be conducted with larger size population to get the broader view about the role of Principle in integrating STEAM education in schools
4. It is recommended that study be conducted which examines the teacher perception on STEAM education.
5. It is also recommended that study be conducted to explore the relationship between the STEAM leader and student to choose the career paths for future aspects.
6. It is recommended that study be conducted to explore the qualities to become STEAM leader for STEAM school.

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