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PART A

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A Look into Global Competence Among ESL Teachers In STEAM Era

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Abstract

Due to globalisation, education has emphasised developing teachers' and students' global competency to learn and work in a diverse community and interconnected world. Individuals are required to have proficiency in the elements of global competence, such as knowledge in global issues, the context of STEAM, interconnectedness, and intercultural awareness. Acquiring global competence means acquiring the elements in various global competence models that have been discussed in past studies. This conceptual paper addresses the significance of ESL teachers' global competence and STEAM-oriented education to enhance students' global and contextual awareness in English language learning. With reference to the most recent literature on teachers' global competence and STEAM, this paper looks into the integration of ESL teachers' global competence and STEAM in the current English language teaching and learning, and also identifies the challenges teachers face. Finally, this paper offers recommendations for the authorities and teachers to explore the strategies to integrate global competence and approaches to STEAM into their pedagogical practices.

Keywords: ESL, Global Competence, Global Knowledge, STEAM, Teaching and Learning of English

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INTRODUCTION

Education continues to evolve with globalisation and technological advancement. The shift in education has brought more attention towards global education. The goals of global education listed by Sinagatullin (2019) include: (1) preparing the future generations to live, work, and cooperate with diverse others, (2) developing a creative and reflective personality who makes constructive decisions and take responsibility, and, (3) developing students' global competence to productively function in their community and global society. These goals are associated with the current global competence needs in the teaching and learning process and STEAM (Science, Technology, Engineering, Arts and Mathematics) education. Global competence development and STEAM knowledge are correlated and significant in preparing future generations to live, work and cooperate in the complex real world.

Students' global awareness in English language learning is vital since English is a medium for gaining and delivering knowledge and information. Learning a language such as English means learning the background and culture of the target language (Hesan et al., 2019). The quality of language students depends on their roles as language users and social

agents who focus not only on being proficient in the language but, most importantly, being competent in using the language effectively in various situations. English is learned as a second or foreign language in Malaysia and other non-native countries. It has also become the language of instructions for STEM (Science, Technology, Engineering, and Mathematics) and when the study of Art opens up new ways of viewing, thinking, and learning Science, thus the birth of STEAM subjects in schools (Bahrum et al., 2017). Therefore, Perignat and Katz-Buonincontro (2019) agreed that English language acquisition is essential, and we must also be aware of the growing interests in STEAM education.

The quality of teachers and students' achievement are often associated with teachers' competency (Goh et al., 2017). Orazbayeza (2016) described competency as showing the functional aspects and abilities required by a particular occupation or system. In language education, as much as teachers' proficiency in English is fundamental, their competency will assist students in learning English more effectively. In Malaysia, ESL teachers' competency remains a significant issue (Goh et al., 2017) because their competency is recorded at a moderate level (Yusof & Yaakob, 2019). Yusof and Yaakob (2019) argued that ESL teachers are equipped with high-level teaching methods and aids but weak in aspects such as pedagogical competence, relevant knowledge of global issues including STEAM, and the skills to compete in the globalisation era. Hence, to ensure the success of meaningful ESL lessons that integrate both global competence and STEAM education, ESL teachers should improve their English teaching competency to deliver essential knowledge.

The 2018 PISA or Programme for International Student Assessment by Organisation for Economic Co-operation and Development (OECD) has reported that Malaysian students scored lower than the OECD average in reading, Science, and Mathematics (Avvisati et al., 2019). Another concern is the lowest awareness of global issues level marked by students in Malaysia with a PISA index of -0.41 and the ranking of 60 among 64 PISA-participating countries and economies. (Education GPS, OECD, 2020). Students' achievement reflects teachers' teaching competency; thus, assessment results and feedback from students set a benchmark for teachers to improve. Based on the results, ESL teachers need to find methods that can boost students' performance in the PISA subjects, and one of them is to integrate global competence and STEAM in ESL lessons. Therefore, this paper addresses the significance of ESL teachers' global competence and the integration in STEAM-oriented education in enhancing ESL students' global and contextual awareness. It will discuss the integration of ESL teachers' global competence and STEAM in the current teaching and learning of English. Apart from that, this paper aims to discuss the challenges faced by teachers.

LITERATURE REVIEW

Global Competence Model

English language learning is associated with learning global knowledge and issues. Globally competent ESL teachers can impart and discuss current world issues in lessons (Mansilla & Wilson, 2020). Hence, developing English teachers' global competence is profound to assist students' global competence acquisition. Global competence by OECD (2020) refers to individuals' abilities to examine local, global and cultural issues, understand and appreciate others' perspectives and views, engage in cross-cultural interactions and collaborations, and finally, take action for sustainable development to protect community well-being. The domains of global competence can be referred to Hunter's (2004) Global Competence Model. There are eight domains of global competence as stated by Hunter (2004) in Figure 1 below:

Figure 1: Global Competence Model (Hunter 2004)

Based on the figure above, there are two colour schemes, mainly blue and green, with blue sections are the external layers (External Readiness) while the green sections are the Internal Readiness. According to Global Competence Associates (2021), the colours are classified as follows: (a) light green core: the ability to know oneself (self-awareness), (b) dark green layer: approach and relationship with others, (c) light blue layer: knowledge of significant cultures around the world, and (d) dark blue layer: interpersonal skills. The model's elements further define each category. As a result, Hunter's definition of global competence in Figure 1 provides the critical aspects required for an individual to be globally competent. These two aspects in education are vital to developing students' global competency.

Global competence is a wide area, and STEAM education can be placed under the umbrella of global competence since understanding science, Technology, Engineering, Arts, and mathematics is vital to contributing to development and community well-being. STEAM education fits in the categories in Hunter's Global Competence Model of global awareness and collaboration across cultures. Educational institutions should produce a young generation who can participate actively in the community and professional interactions that address critical global and local issues (Taylor, 2016; Sinagatullin, 2019). These are parts of the requirements of holistic 21st century and globally-ready students. It has been listed that a modern successful person' characteristics are (1) creative, (2) analytical, (3) innovative thinking, (4) can work on projects in a team, and (5) information literacy and skills for information and communication technologies (Hlukhaniuk et al., 2020). Besides, these characteristics are aligned with some characteristics of a globally competent individual and the goals of STEAM education (Tichnor-Wagner et al., 2016). The similarities and correlations show that the integration is appropriate in the current education scenario.

ESL TEACHERS' GLOBAL COMPETENCE AND STEAM EDUCATION

Increasing teachers' awareness and students' interest in STEAM education is vital (Bahrum, 2017). Similarly, aligning ESL teachers' global competence in STEAM subjects is a timely process. Globally competent ESL teachers in the STEAM era can contextualise global issues with the locals (Kopish, 2017). By incorporating STEAM knowledge in English lessons, teachers provide opportunities for students to connect global learning to critical stances, including what is relevant in their local community (Yoon et al., 2018). The lessons are designed to encourage creative and critical thinking (Tichnor-Wagner et al., 2016) and problem-solving skills among students in real-world settings (Perignat & Katz-Buonincontro, 2019).

STEAM refers to the five subjects that require critical and creative thinking skills by education and career. The importance of advancing learning in STEAM disciplines is to engage minority students in STEAM subjects, ensuring that it is inclusive and everyone has equal opportunities in learning and career choices (Perignat & Katz-Buonincontro, 2019; Mansilla & Wilson, 2020). Besides, it is crucial to stimulate students' interests in STEAM fields and develop skills necessary for STEAM careers (Perignat & Katz-Buonincontro, 2019; Luo, 2019). Thus, the STEAM contents are incorporated in English lessons to establish equality, initiate knowledge transfer across disciplines, and encourage ESL students to explore and experience new ways of knowing (Perignat & Katz-Buonincontro, 2019).

Taylor (2016) mentioned that STEAM education in the 21st century is connected to global education as it incorporates global issues and embraces interdisciplinarity. The idea is supported by Bahrum (2017), who stated that integrating STEAM and global competence in ESL lessons trains students to collaborate and communicate with others in a real-life context using English as an international language. Language holds the knowledge together, and learning STEAM in English will facilitate more 21st century and international collaboration and innovation (Broderick, 2016). By integrating global competence and STEAM, education can strengthen students' skills, science knowledge, and inquiry skills in preparation for students as future citizens (Taylor, 2016). Since problem-solving, project-based, and hands-on learning are the large component of the STEAM approach, ESL learning can be done more student-centered and effectively (Broderick, 2016). Students can practise English in a relatable context and are actively involved in the activities assigned

to them (Bahrum, 2017). It shares similar learning goals to create a meaningful language lesson, and such a lesson becomes a primary platform for ESL students to prepare themselves with necessary global knowledge and skills.

The significance of ESL teachers' global competence is to provide a meaningful English lesson that allows students to learn in context and relate to real-life (Bahrum, 2017). While STEAM education is a curriculum philosophy for Science teachers, it is not limited to the said subject since all teachers are involved in establishing a 21st-century education and their role as professionals (Taylor, 2016). The integration of STEAM-oriented education in ESL lessons brings more meaning to language learning since the content is relatable, authentic, and current. The domains of language and STEAM teaching and learning strategies are correlated in various ways (Luo, 2019). ESL teachers can design the English lessons to center around global awareness that includes Science, Mathematics, and Arts relevant in real life. Taylor (2016) stressed that teachers from various learning areas can cooperate on building an integrated curriculum using STEAM education as a creative design learning environment. It is similar to ESL students learning Literature, Humanities, and Social Studies (Bahrum, 2017). Thus, ESL students can learn English in a more relevant context of their daily life and future interests.

STEAM in language education generates more comprehensive and relevant learning content that addresses global aspects (Broderick, 2016). Additionally, ESL teachers' understanding of STEAM subjects as part of global competence will assist students' language development and their global, creative, and innovative skills (Hlukhaniuk et al., 2020). As highlighted in the Malaysian education blueprint and past studies, graduates with creative and innovative qualities are required in today's workforce (Taylor, 2016; Hlukhaniuk et al., 2020). Integrating global competence and STEAM in English teaching and learning would cater to the students' language needs within a context or discipline (Mohamed et al., 2020). Mohamed et al. (2020) added that English language teaching must be connected to students' disciplinary context, academically and professionally, for meaningful learning. Thus, content-based teaching and learning are more crucial than language input. To sum up, global competence and STEAM will prepare students to perform better for their future tertiary education life and career interests.

According to Broderick (2016), the Arts in STEAM reflects multifaceted and shows how STEAM includes language learning. As aforementioned, from the integration, ESL lessons could deliver more meaningful content for students. This type of interdisciplinary teaching and learning approach shown by ESL teachers brings positive progress in education to address global and significant content for students. Similarly, ESL teaching using interdisciplinary methods can cultivate cognitive ability and promote higher-order cognition learning processes (Luo, 2019). Developing students' cognitive ability is helpful for them to be critical, creative, and innovative of the global issues and emergence of technological trends. Thus, this paper situates STEAM subjects as the elements of global competence, and the integration in ESL lessons will further enhance students' global and contextual awareness.

ESL TEACHERS' CHALLENGES

ESL teachers who show globally competent teaching can prepare ESL students for complex societies and the global economy (Mansilla & Wilson, 2020). However, there are challenges in developing global competence and incorporating global competence and STEAM in ESL lessons. The rapid advancement in science and technology needs teachers' professional development programmes to mirror the current trend (Canaran & Mirici, 2020). Firstly, ESL teachers need more practical direction to assist in implementing global competence in ESL lessons (Kerkhoff & Cloud, 2020). Even more, when STEAM comes into the picture, more content-related supports are vital to developing ESL teachers' understanding, knowledge, and skills (Luo, 2019). Mohamed et al. (2020) described a finding from a past study that showed English teachers having difficulties in providing the language discourse for a specific STEAM subject because they were not specialists in that particular field. This emphasises the need for courses and programmes that are designed to assist ESL teachers' content teaching.

Structuring teaching and learning which incorporates

language and content is challenging (Mohamed et al., 2020). Therefore, it is vital to revise the appropriate approach to teach global competence and STEAM content in English language lessons. The integration will strengthen the curriculum and make STEAM education comprehensive and inclusive in even language lessons (Bahrum, 2017). This is a thoughtful shift in 21st-century education that demanded solutions to more global problems faced by the world community, such as tsunamis, floods, earthquakes, technology illiteracy, and economic crisis that students can start building the expertise by responding to these issues in ESL lessons (Bahrum, 2017).

According to Kerkhoff and Cloud (2020), teachers must be trained in teaching global competence to achieve a desirable shift in education. In this paper, global competence is inclusive of the understanding and knowledge of STEAM education. Generally, ESL teachers develop global competence through attending professional development programmes organised by the Ministry of Education. Although teachers are required to participate in various professional development programmes, it is mentioned that the programmes by MoE for English teachers are often assisting them with the implementation of the CEFR-aligned syllabus (Sukri et al., 2017). The materials to enhance ESL teachers' lesson planning inclusive of global awareness are given but not explicitly addressing ESL teachers' crucial needs, such as the teachers' global competence development (Sukri et al., 2017). This requires some more effective and practical changes to enhance ESL teachers' global competency and STEAM knowledge.

Another study by Canaran and Mirici (2020) has found that since English teachers were not offered the active role in either designing or implementing the professional development programmes by the authorities, the programmes organised may not cater to their actual needs. The content of professional development programmes should be carefully designed for their impact on ESL teachers' knowledge, skills, and pedagogy (Hiew & Murray, 2018). Thus, the MoE should investigate the designs of programmes as mentioned earlier for ESL teachers to ensure their relevance to teachers' teaching needs (Hiew & Murray, 2018; Sukri et al., 2017). As supported by Luo (2019), it is recommended that the MoE incorporate interdisciplinary aspects into their pre-service and in-service ESL teacher training programmes and course redesigns as they build and redevelop them.

CONCLUSION

Global competence development among ESL teachers and students in today's STEAM era has become prevalent. The interconnected and intercultural communities require individuals who are ready to fit in and compete in the era. Likewise, ESL teachers ought to undergo preparation to be interdisciplinary ESL teachers is feasible if the teachers are given proper supports and programmes. More research in the related field of global competence and global competence and STEAM education can be conducted in various methods since this timely topic could contribute to education development. This review paper is valuable and insightful for the education authorities, the MoE, and ESL educators to understand the significance of ESL teachers' global competence and the integration in STEAM-oriented education.

It is suggested that a proper guideline on how ESL teachers can implement globally competent teaching that includes broad subject areas, particularly STEAM, should be created. Another recommendation is for the MoE to address the relevance of this topic in current and future education via workshops, training programmes, and programmes for pre-service and in-service ESL teachers. In doing so, it is reasonable to involve ESL teachers in the decision-making, and design processes of the programme content since the inclusion of teachers will add value and validity to the programmes (Hiew & Murray, 2018). The challenges faced by ESL teachers during the acquisition and implementation processes should be given proper treatment to ensure the success of the integration of STEAM in globally competent ESL teaching and learning.

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Application of STEM Models in Mathematics Classrooms at Secondary Schools

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Abstract

The emphasis of integrated STEM education (science, technology, engineering, and mathematics) is an opportunity for innovation, creativity, and change in mathematics classrooms. Applying the knowledge, students learn in mathematics to analyze real-life or realistic situations, science' and technology's problem encourages their learning process effectively. However, the orientations of conducting STEM education in Mathematics classrooms are needed to study: What models are effective? How do teachers make lesson plans, encourage and support students to participate in activities? This paper presents some STEM models in math class and examples of doing them in secondary school mathematics lessons. Teachers have ideas and orientations of STEM education for the learning and teaching of Mathematics in the classrooms in Vietnam.

Keywords: STEM education, Mathematics, Secondary School.

INTRODUCTION

STEM education (science, technology, engineering, mathematics) has been studied and has seen significant changes over the past several years in developed countries because of the need to increase STEM literacy and motivate students to get a job and develop a career in these fields (Emily, A.D, 2009). STEM education helps students develop problem–solving skills, communication skills, and teamwork in real-world contexts. Vietnam's government has had ambitions of developing STEM education into the educational curriculum since 2017. The reality is that teachers in Vietnam have a limited understanding of STEM and different models of STEM education what one can be effective ways to implement in their classrooms. The purpose of this study explored how to apply STEM models in Math classrooms in secondary schools, including guidelines, ideas, advantages, and disadvantages, for example, lesson plans. This study synthetics to find conceptional models of STEM integrations in various theories that have already been learned and then explore which conceptions are effective for teachers. From different models of STEM, which models can apply in Mathematics classroom, assess the strategies and equipment required on teaching integrated STEM education.

LITERATURE REVIEW

Definition of STEM and STEM education

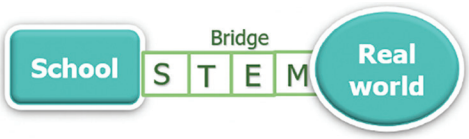
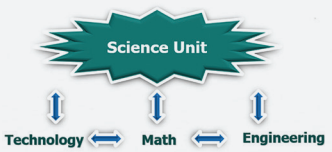
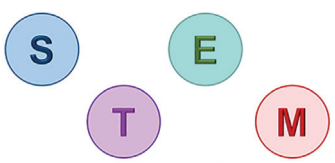
STEM is an acronym for the four independent disciplines of science, technology, engineering, and mathematics, often involving traditional coursework and teaching separately at school (Noleine, F., 2015). STEM instructional practice in the school curriculum improves students' STEM achievement and increases their interest in STEM careers. However, educators at all levels worldwide also have different conceptions of what STEM education is, leading to a variety of definitions.

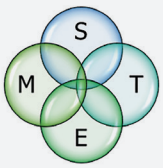
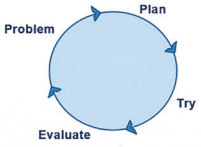
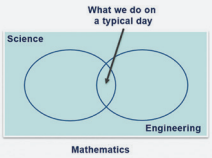
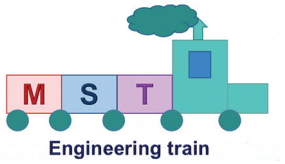
STEM is represented in many ways. For instance, Bybee (2013) described nine models of STEM that policymakers, educators, and researchers use to communicate about STEM education; these models range from referring to STEM as a replacement term for a single discipline to STEM as a transdisciplinary course or program. These models focus on how science, technology, engineering, and mathematics relate to one another, not on instructional practice, which is limited for classroom teachers. (Emily, A.D., Elizabeth, A.R., & Gillian, H.R., 2009) Other models of STEM education include the shift from traditional lecture-based classrooms to the implementation of pedagogy that involves more inquiry and problem-based learning approaches; curricula that integrate science, technology, engineering, and mathematics concepts in ways that most closely reflect that practice of professionals working in STEM jobs (Wajeeh, D., 2012) In 2017, Ring et al. introduced eight common conceptional models which focused on understanding the STEM conceptions of K-12 science teachers and developing integrated STEM curricula. These models were studied and compared different realities of various models and noting the common features to find a better model that is satisfactory to a group of people, and teachers can implement them in classrooms. These models also were supported to use in Vietnam for teachers from pre-elementary to high school education. (Bien, N.V., & Hai, T.D, 2019).

TEACHERS' CONCEPTIONS OF STEM EDUCATION

Despite the work of educational researchers to better define STEM education, there has been a distinct dearth of researchers surrounding how teachers conceptualize STEM education. After training courses, teachers planned and implemented what they deemed to be STEM lessons, and they still were not confident in identifying what STEM education was. They recognized that it should include integration between science, technology, engineering, and mathematics; focus on student-centered practices that incorporate hands-on activities and be grounded in real-world learning and problem-solving (Emily, A.D., 2009). In Ring et al. (2017) research, he asked K-12 teachers to draw their conceptual models of integrated STEM education on three occasions. Analysis of these teacher-generated models revealed that teachers held different conceptions of STEM, but core patterns existed across the teachers' models. This work identified eight STEM models as representative of the teacher conceptions, and they describe in table 1. below.

Table 1: Eight models of STEM education with descriptions (Ring, E.A, 2017)

Stem Model Code	Image of Model	Brief Description
A – STEM as an Acronym		Models showed a traditional model of teaching science or mathematics in separate classrooms with little emphasis on the roles of technology and engineering pedagogies.
B – Real-World Problem Solving as Context		Models showed STEM education as focusing on the relationship between school and the real world, providing contexts to make STEM concepts relevant to students' lives.
C – Science as Context		Models represented STEM education as teaching scientific concepts while calling upon technology, engineering, and mathematics as needed.
D – Science, Technology, Engineering, and Mathematics as Separate Disciplines		Models depicted siloed disciplines that included other disciplines as supporting roles, but these did not integrate across the disciplines in meaningful or substantial ways.

E – Integrated Disciplines		Models had components that represented the confluence of science, technology, engineering, and mathematics teaching.
F – Engineering Design Process as Context		Models focused on the iterative process of engineering design as how students learn science and mathematics concepts using technology.
G – Science and Engineering Design Process as Context		Models emphasized teaching scientific concepts and the engineering design process using technology and mathematical concepts when appropriate.
H – Engineering as Context		Models represented an emphasis on engineering calling upon science, technology, and mathematics as needed.

The teachers said there were no right or wrong answers in the arrangement they made, and the educators shared no additional information about the eight models. Teachers ranked the eight models from the least desirable to the most desirable, and then they have a shared definition, or conceptual model of STEM education is critical. Educators can meaningfully bring STEM into their classrooms by creating a common conceptional understanding surrounding STEM education and what it means for practice.

STEM EDUCATIONS IN LEARNING AND TEACHING MATH AT SCHOOLS.

The implementation of a STEM education raises challenges in learning and teaching mathematics but transforming the current educational paradigm toward a STEM education has the potential to reflects the real-life situations outside of school and assist students in developing the knowledge and ability to deal with change and challenge in sensible ways (Wajeeh, D., 2020). Mathematics underpins the other disciplines of STEM because it serves as a language for science, engineering, and technology. Mathematics gives basic structure and supports the other disciplines sets mathematics up to support integrative STEM education contexts (Noleine, F., 2015). STEM education does not aim to guide students to become mathematicians, scientists, and engineers, but it develops the potential to pursue and adjust to the technology world. Teaching Mathematics in integrated STEM education can help students have "Mathematics skills," which means they can recognize and understand the importance of Mathematics in real-world problems. Students have opportunities to practice, generate new ideas, and apply the knowledge they learn to solve problems. In traditional teaching, which focus on teacher-centered practice, students do not have many chances to develop real-life skills. It is also a weakness of Vietnamese students in international competitions. They can solve equations, exercises, but they lack the ideas and skills to solve real situations.

METHODS

The emphasis in this study was on understanding various models of STEM and methodologies in teaching Mathematics at Secondary Schools. From that, evaluate the models' potential to implement in the classroom, how teachers can do it, that give examples and guidelines so teachers and educators can base on and make their activities and lesson plan on teaching. Also, we conducted this study in real classrooms with 25-30 students for each class, with projects and observers to follow how students

react and take tests to see results.

The limits of this method are that we have not had data collection teachers and students as study context, participants. The process of this study bases on the authors' experiments on teaching and synthetics from documents that already study STEM models, in general, to find out which can be potential in Mathematics classrooms. This study is the framework for the next steps on participants (teachers and students), so from conceptual models across groups of people to check the examples that we suggest in this study. The STEM models and ideas must be tested through educational research methods to determine if these models improve the teaching and learning of STEM content, especially Mathematics content. A study must be designed to test three models with clear lesson plans under various conditions in the classroom to determine the best approach to integrated STEM (Vasquez, J.A, 2013). And then, authors and educators need to document their interventions, curriculum, and programs implemented in more detail and how subjects are integrated and supported. Precise results need to be identified, measured, and evaluated concerning how integrated STEM education promotes students on learning, thinking, interest, and other characteristics related to these objectives. The research focused on interest students and teachers must address diversity and equity and include more design experiments and longitudinal studies. Through these recommendations were made in the context of the Vietnamese education system, they could also use effectively in other countries' educational systems.

RESULTS

The model coding process described above led to eight major models of STEM integration with three distinct support codes (see Table 1). These models represent the variety of conceptions of STEM that teachers held at some point in their professional development (Ring, E.A & Dare, E.A, 2017). In the Vietnamese Mathematics classroom, we find three models that have chances and are suitable for teachers to make a lesson plan and hold activities in classrooms. They are B – Real-world problem solving as context, C- Science as context, and D – Integrated discipline. As below, we describe each model and example carefully in Math classrooms.

REAL-WORLD PROBLEM SOLVING AS CONTEXT

For this model, teachers tend to envision integrated STEM education, focusing on making STEM concepts as relevant as possible for students (Michael, B., 2009). Teachers create lesson plans with problems that connect with real life. This idea of teaching and learning through real-world situations follows the National Council of Teachers of Mathematics (NCTM) learning and assessment principles. Students are learning on the knowledge they had already gained and putting it toward new applicable life problems, solving problems based on real-life builds upon all of the process standards (Radloff, J., & Guzey, S., 2016). The student has built new mathematical knowledge through problem-solving. The student uses mathematics as reasonable to explain real-life problems. They can make connections through what they have learned in class and the problem in front of them. Math teachers' goal is to give the kids the knowledge they need to function in the real world. More importantly, our ultimate goal is to have our students go out into the real world and solve problems they may not have been solved before. To do this, they need to use new and unique ways of coming up with solutions. Presenting students with new problems will give the students the necessary comfort to be avid problem solvers. For instance, teaching Lesson: Point of Symmetry or Lesson: Line of Symmetry, grade 6, teachers can give students examples of real-life objects (six-pointed star, ASEAN flag, or Snowflake) (Khoai, H.H, & Doan, N.H, 2021); other examples, Lesson: Polygons, grade 8, teachers can hold activities of sorting things that students can search on the Internet and find pictures of polygons on objects. Students will context and see what they learn in their life.

Point of symmetry or Line of symmetry, grade 6

Six- pointed star ASEAN flag Snowflake

Polygon, grade 8	
	
Tessellation tiles	Tessellation T-shirt

Figure 1

Making mathematics practical and useful to the students in the real world should focus on all mathematics teachers. However, there is no one and easy way to do this. It depends on the many different learning styles of the students and the many different personalities of the teachers. There is a good way to force the students to think about real-life applications through real-life situations. However, it is essential to make the issues applicable to the student's lives for them to make the connections needed to be meaningful. So, model B is a good way for teachers to bring in their classes, and mathematics can connect with sciences, technology, engineering, and students can solve real problems.

SCIENCE AS CONTEXT

Teachers represented STEM education as teaching scientific concepts using technology, engineering, and mathematics as appropriate (Venville, G., 1998). In Mathematics, teachers can design warm-up problems or learning problems from what students learn in Physics, Biology, Chemistry, ICT, etc. Let students use Mathematics to solve these problems.

Figure 2. Balance hearts

Also, schools can hold a STEM festival or STEM days, STEM clubs. Therefore, students have chances to practice their Mathematics knowledge in games, activities, science projects. For example, biology lesson "Needs of plants," students can use the skill of data collections to make a table, they measure the length of the plants while providing different things for plants and then explain the experience by searching information on books or the Internets; other example balance forces, students can use the definition of the midpoint of a segment, the centroid of a triangle or the center of different regular shapes to create a balance object.

INTEGRATED DISCIPLINES

Teachers used models that had components that represented the confluence of STEM teaching (e.g., Venn diagrams) (Kelley, T.R & Knowles, J.G, 2016).

Figure 3. Balance sculptures

Moore et al. (2014) defined STEM education as "an effort to combine some or all of the four disciplines of sciences, technology, engineering, and mathematics into one class, unit, or lesson that bases on connections between subjects and real-world problems." This model is the highest level of STEM education approaches, where it can contain STEM content learning objects primarily focused on one subject, but contexts can come from other STEM subjects (Kelley, T.R & Knowles, J.G., 2016). In secondary schools in Vietnam, teachers can implement this model in Mathematics classrooms. It requires a long time and very well-prepared instruction, so students can do it in class. For example, when students learn forces in grade 6 or 7, the water rocket will be an exciting lesson that teachers can implement STEM in the classroom. The expectation we present in table 2.

Table 2. Integrated Disciplines in teaching forces by making water rocket models.

Mathematics	Measure the length of materials

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to be symmetrical (measure the plastics bottle, the three wings. When they stick the wings on the bottle such that three wings will balance the rocket. Calculate and make a table to record the numbers on the process.

Science Students will learn forces from this model. Forces always work in pair, force, and reaction forces. When the students pump air into the rocket, the air pressure builds up until it pushes out the cork, and here, the water is a powerful force. The downward force creates an upward reaction force that launches the rocker. When all the water has gone, and the pressure inside the bottle is back to normal, the forces disappear, and your rocker will fall to Earth.

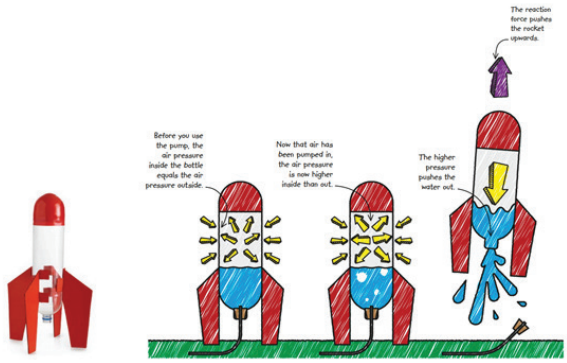

Figure 4. Water Rocker, Maker Lab Outdoors (Jack, C., 2018)

Technology Search information, how a rocket works in real life, and explain this model. In real-world science, a rocket works in the same way as your water rocket – but it is not a bicycle pump that creates the pressure inside the rocket. Instead, rocket fuel burns very quickly, producing huge amounts of exhaust gas. As new gas is produced, it pushes down on the gas already there, pushing the rocket upward.

Figure 5. Models of the subsets of real numbers

Engineering Strongly construct the water rocker from materials (bottles, tapes, tennis balls, scissors, foot pumps, etc.). Students need to do it step by step and try to construct the model that can work. They can keep working and trying until they have a successful model.

Other examples of teaching the set of real numbers, we let students practiced making a ball model. This model will classify balls with natural numbers, whole numbers, rational numbers, irrational numbers, and real numbers. Students need to recall mathematics knowledge to write these numbers and construct a model with holes, so the ball can run from the first hole to the end, example from students in grade 7, Phuc Loi Secondary School, Long Bien, Hanoi Vietnam. In grade 8, in the Revision lesson, making a foot carpet from paper and finding real carpets in their houses, the example picture from students in grade 8A6, Sai Dong Secondary School, Long Bien, Hanoi, Vietnam.

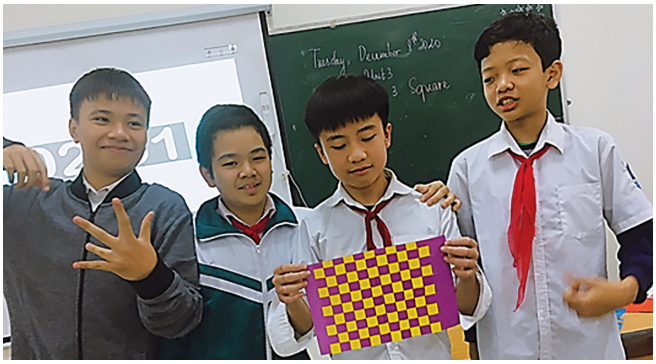

Figure 6. Carpet models from paper.

CONCLUSION

Understanding what STEM education is and how to implement it is a complex process. Educators at all levels have different conceptions that lead to a variety of STEM models. In Vietnam, the Ministry of Education has had strong institutional attention since 2017, and STEM education has concretized in direction documents and action plans. Teachers need specific instructions and support to meaningfully bring STEM into their classrooms, which is why this study suggested which three STEM models out of many models can apply and examples in Math lessons at Secondary School. It helps educators have ideas to implement the new approach in teaching at their school.

Studies have shown that students are motivated and

perform better on Mathematics content assessment when teachers use an integrated STEM education approach. "Students are willing to know not only how to complete a mathematical task but also what they need to learn mathematics in the first place. They want to know mathematics is relevant to their life" (Williams, D., 2007). This study suggests teachers and educators are needed to begin by grounding their conceptual understanding of integrated STEM education by teaching critical learning theories, pedagogical approaches and building awareness of research results of secondary STEM education initiatives. Furthermore, teachers should train and practice to build confidence in teaching integrated STEM approaches. Teachers can implement effective classroom methodologies and what level of support students and teachers require to improve STEM education.

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Digital Tools in The Learning Process And etwinning Projects

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Abstract

This article deals with the general problem how to be an excellent teacher during our not easy time. There are a lot of digital resources and it's so difficult to choose what is more appropriate for us and our students and understand what digital learning is. Every student will see its benefit over other traditional learning methods. In the era of technology, we believe that inclusion of digital tools in the learning cycle can help our students to become technologically competent, enables critical thinking and allows them virtual collaboration or team building during hard time like COVID-19. ICT in education through eTwinning allows more online practices, sharing of resources, use of wide range of tools for teaching and learning which ultimately benefits the who education community.

Keywords: Digital Tools, ICT, etwinning

INTRODUCTION

In the 21st century students should have a lot of competences (Joynec, C., 2019, OECD, 2008). Digital competence is essential for learning, work and active participation in society (Pettersson, F., 2018). In field of education incorporation of digital tools can make teaching and learning process more interactive, creative, easy access to many educational resources at web which in the long run benefits the whole education system to reach the target goal. A digital competent teacher can make his/her classes/ lesson more lively and related to the real life experiences which attracts students mindset towards learning and thus achieves the goal of the process.

Digital competence is drawing the attention of the educational stakeholders since past few decades. Many countries around the globe have already integrates it in their respective educational system depending on the context of the issue. The largest teacher network in Europe, eTwinning, has been working on this digital competence to inspire, engage & empower the teaching community towards digital education. eTwinning provides a good environment for teachers to collaborate with peers and learn about new ways of using ICT for teaching. For example, eTwinners report an increase in their digital teaching and learning practices, e.g. participation in online courses (78%), collaborative creation of materials with students (77%), or use of social networks with students (76%).

Digital competence of teachers through eTwinning is creating a technologically sound future generation who can focus on Machine learning, Artificial Intelligence, Virtual reality to deal the upcoming 21st century education. Due to the digital learning students can continue their studies, nevertheless. We were able to get acquainted with unbelievable resources which became our best friends in different situations. We can use various IT tools during all stages of the lesson.

Introducing new technology, new programs, new LMS (learning management system) in eTwinning can bring more success in future. New teaching techniques are focusing on inclusion of digital tools and thus eTwinning can play a vital role in Europe to shape their education which can better sustain to create a new generation with digital competent.

DIGITAL LEARNING –WHAT IS IT?

Distance learning describes any learning that happens without the students being physically present in the lesson. Students are learning through engaging methods such as peer education, teamwork, problem-solving, reverse teaching, concept maps, gamification, staging, role playing, and storytelling. Here students & teachers are getting the scope of use different learning software, programs and tools to make the teaching and learning process more effective. Animation, simulation and 3D images gives students more accurate or realistic view point of that specific issue which helps to deepen their understanding.

BENEFITS OF DIGITAL LEARNING OVER TRADITIONAL EDUCATION METHODS.

Traditional or mostly known as face to face instruction method sometimes faces challenges to explain some issues where digital learning shows a great success. Some of the key benefits of digital learning can be listed as follows-

- Digital learning makes students smarter.
- Digital learning is making students self-motivated and more accountable.
- Digital learning tools involve educators and parents to a deeper extent.
- Digital learning tools and technology is rapidly increasing information sharing.
- Increasing students' employability with digital learning tools and technology.
- Learning tools and technologies like social learning platforms make it easy for teachers to create and manage groups for students and their parents. (For example, we used Telegram, Viber, What's up, Google Classroom)
- Digital learning tools and technology provide enjoyment for kids as well as numerous benefits in terms of developing a child's well-being.
- Online warmups are particularly useful at the beginning of an online meeting. Benefits of warmups:
  - ✔ Reduce shyness
  - ✔ Help participants familiarize themselves with digital tools
  - ✔ Keep participants focused and away from distractions
  - ✔ Encourage individual self-expression
  - ✔ Improve creative thinking
  - ✔ Motivate students for studying

ONLINE RESOURCES FOR DIGITAL LEARNING

Digital learning enables the frequent use of different online resources for making teaching and learning process more effective and engaging (Chauhan A., 2018). Here a list of online resources with their features have been listed (Teacher Academy,2020, Achieve Virtual 2020, Symbaloo, 2021, Blendspace, 2021) :

Web sites/ links	Features
https://jeopardylabs.com/ https://create.kahoot.it/ https://quizizz.com/ https://www.baamboozle.com/ https://www.youtube.com/	For Vocabulary Teaching & Learning
https://www.mentimeter.com/	Interact with your audience using real-time voting and see results at once.
https://learningapps.org/	May be excellent tools for memorizing new words, phrases, and grammar rules.
https://www gamestolearnenglish.com	For learning vocabulary playing.
https://wordwall.net/	For grammar practices.
https://app.wizer.me/	A platform where teachers build beautiful, engaging online worksheets and you can practice grammar.
https://www.liveworksheets.com/	Allows printable worksheets into self-correcting interactive exercises that the students can do online and send to the teacher.
Flipgrid	A website that allows teachers to create "grids"to facilitate video discussions.
https://vocaroo.com	For recording the voice.
https://l-www.voki.com/	A fun tool that students can use for homework, classwork or projects.

Edpuzzle	A free assessment-centered tool that allows teachers and students to create interactive online videos.
https://www.esl-lab.com/	For improving English listening comprehension skills through conversations and doing different tasks.
CANVA https://www.canva.com	Gives you all the tools you need to design. Choose from hundreds of professionally designed layouts or create your own designs.
Google forms https://www.google.com/forms/	For drafting forms, survey, taking tests.
https://www.examenglish.com/	Free top-quality practice for all the important international English language exams. All test questions are written by experienced teachers and examiners.
Google Classroom	We used GOOGLE CLASSROM for all our tasks. Classroom helps students and teachers organize student work.
Padlet (https://padlet.com/)	One of the best apps. It is free; allows collaboration; every content is visible by every student/teacher (transparency); It gives you the possibility to edit your post, but you cannot change what others have written there (only if you are the Administrator of the Padlet);It is easy to share (everyone who has the link can edit); You do not need to create an account to post on a Padlet (this is why my students adore Padlet)

CONCLUSION

Nowadays we can't imagine our teaching and learning without modern digital tools. They help us to plan, communicate, boost our knowledge and share our experience. Everyone can get access to different resources. We should be happy as we live in a time of great possibilities and development for the use of technology to support learning everywhere. It is just necessary to provide a rich learning environment for students to develop such skills that include contextual relevance, and opportunities for practice, discussion and feedback. As a result, we are likely to combine different methods of teaching.

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Integrating STEM in English Lessons for Senior High School and Low-Secondary School Students

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Abstract

Most people are frequently hearing the term "STEM" these days; however, many of them are not genuinely aware of the term's real meaning. STEM is an innovative method of teaching and it stands for Science, Technology, Engineering, and Mathematics (David, 2014a), but it has a profound meaning except for these subjects. On the other hand, English has an important role as a lingua franca of science and technology. The students need to improve their language skills for being fulfilled with the necessary skills as individuals. This study aims to integrate STEM activities with English language learning. Both STEM activities and English language learning activities were used in the practice. It was conducted for 11th and 6th grades students. The research design used in this study was a pre-test and a post-test for the participant students. In addition, a set of questionnaires were distributed to measure students' perception of learning English difficulties and knowledge of the STEM field and to compare two different grades of students' results at the end. The results of the pre-test showed that the students weren't interested in learning English both at high school and low secondary, they had no information about STEM. The post-test indicated that STEM could make both levels of students enjoy learning English through STEM activities. Thus, the study suggests the EFL teachers implement STEM in their English classroom practice as it can boost students' interest in learning.

Keywords: English Language Teaching, STEM, English Classroom

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INTRODUCTION:

According to the OECD report published in 2009, the changing nature of society and economy necessitates educational systems equip young people with new skills and competencies that enable them to benefit from emerging new forms of socialization and actively contribute to economic development in a knowledge-based economy. These new skills and competencies are frequently referred to as 21st-century skills and competencies to emphasize their relevance to emerging models of economic and social development rather than to those of the previous century, which were suited to an industrial mode of production. (21st Century Skills and Competences for New Millennium Learners in OECD Countries | READ Online, 2009)

Therefore, governments should make an effort to correctly identify and conceptualize the set of skills and competences that are required so that they may be incorporated into the educational standards that every student should be able to achieve by the completion of obligatory secondary education.

There are two prerequisites for governments to meet in order to be effective in this process, and they should be recognized by their citizens. In order to achieve success, it is essential that both economic and social institutions, ranging from businesses to higher education institutions, participate. On the other hand, unless this set of skills and competencies becomes the very core of what teachers and schools should care about, all of this process runs the risk of becoming irrelevant to schools. This can only be accomplished by incorporating them into national education standards that are enforced and assessed by governments. (Ananiadou, K., & Claro, M. 2009).

A significant concern is the definition of the terms "skills" and "competence," as well as the relationship between the two terms and one another.

An individual's competency consists of more than just knowledge or abilities. To be effective, one must be able to satisfy complicated demands by drawing on and mobilizing psychological resources (including skills and attitudes) in a specific setting. When it comes to communicating effectively, an individual's knowledge of the language, practical IT skills, and attitudes toward others with whom he or she is speaking are all factors that contribute to this competency (Rychen, D. S. & Hersch, S. L. (Eds) (2003).

A skill, on the other hand, is the ability to do tasks and solve issues, whereas a competence is the ability to apply learning outcomes adequately in a particular environment (such as school, work, personal or professional growth). In addition to cognitive parts (including the application of theory, concepts, or tacit knowledge), competence incorporates functional features (involving technical abilities), interpersonal traits (for example, interpersonal or organizational skills), and ethical principles. As a result, a competency is a more general notion that may include abilities (as well as attitudes, knowledge, and so on), and the 21st century competencies were the primary emphasis of this study. The decision was made to include both in the questionnaire submitted to national representatives, despite the fact that the phrases are occasionally used interchangeably or with slightly different definitions in different nations and languages. This was also in keeping with the goal of collecting as much relevant information as possible from as wide a range of sources as feasible.

On the other hand, the importance of English in reaching scientific facts is a must that cannot be ignored. It is the lingua franca of reaching the information. Many of the studies and research are in English. To understand them, all of them are possible if one has a good knowledge of the English language. This is because the teachers start teaching English at the very beginner level of students, at the pre-school level in some private schools, and 2nd graders in public schools in Turkey. Younger students have fun while they are learning English because there are lots of joy, games, songs, and many enjoyable activities.

However, it was seen that high school students, especially when they come to the 11th class and when they are so close to choosing their future jobs, start to withdraw themselves from studying English and focus only on the selected subjects at school. As there is a university entrance exam in Turkey, where you need to take two sessions and solve lots of test questions from main courses like Turkish, Geography, History, Religious Education, Philosophy and beside their field lessons such as Physics, Biology, Chemistry, Mathematics, the high school students are mainly focused on these lessons. Then, they will choose which program they will study and at which university. This is all about their future career and so it is understandable that they give importance to their exam studies. However, when they ignore learning English, they will have a bigger problem than they need to study a preparatory class in the first year of their university. They start from scratch but it will be more difficult to learn English at that point because they have forgotten lots of things and the trainers at faculties think that they know English.

This situation is the same for low-secondary school students. They take English as a compulsory lesson three hours a week which is not an efficient frequency to learn a foreign language. They are not aware of STEM activities and the importance of STEM skills for their future jobs. This work aimed to create an awareness of the importance of English and taking it when necessary.

According to a new report from the National Academies of Sciences, Engineering, and Medicine, a shift in how science, technology, engineering, and mathematics (STEM) disciplines are taught to children in grades K-12 who are learning English is

required. Educators must acknowledge the assets that English learners (ELs) bring to the classroom and understand that access to appropriate program models and training has a major impact on student achievement. Providing pathways to success in STEM for the nation's ELs provides opportunity for children and their families, as well as societal advantages, according to the report. And this study was born due to these factors. The students who were in 11th grade worked on the project. There were 40 students in the class and only 5 of them were eager to participate in the project at the beginning. Yet, they saw the project's activities were enjoyable and useful for their other subjects, the number of the participants reached 20 in a very short time.

For the study in a low-secondary school, the students were in 6th grade. They were 20 students and they were all volunteered and enthusiastic to learn about STEM and English together.

HISTORICAL ASPECT

The National Science Foundation (NSF) began using the abbreviation "SMET" to refer to "science, mathematics, engineering, and technology" in the 1990s as a shorthand for "science, mathematics, engineering, and technology." When a National Science Foundation program officer protested that the abbreviation "SMET" sounded too much like the word "smut," the "STEM" acronym was established. As recently as 2003, only a small percentage of the population understood what it signified. Almost everyone is now familiar with the abbreviation STEM, which stands for science, technology, engineering, and mathematics. (Sanders, 2008)

Although STEM concepts were used in plenty of fields, such as the Industrial Revolution and inventions by people like Thomas Edison, STEM was not found in traditional educational settings. STEM, which is short for Science, Technology, Engineering, and Mathematics, was mostly employed by engineering corporations to develop things like the light bulb, cars, and machines. Those responsible for these breakthroughs were under-educated, albeit many of them were trained in apprenticeships. Take Henry Ford, for example: Even though he never went to college, Henry Ford had the good fortune to work with Thomas Edison for years. While they built some of the most important innovations in history, the "giants" of invention mostly relied on STEM principles, as STEM education was not widely available (White, D. W. 2014)

As mentioned in this study earlier, STEM stands for science, technology, engineering, and mathematics, but we are seeing an increase in the use of another abbreviation that is similar, STEAM. The added "A" stands for arts, and it is alleged that it functions in conjunction with the other disciplines. Although some opponents have voiced concern that a focus on the arts may divert students' attention away from STEM courses, the STEAM movement has served to better stimulate students' imaginations and, as a result, has assisted them in concentrating more on creativity through hands-on STEM projects. (Liao, C. 2016).

However, STEM is not a field only for one field of study; but it is for several activities in which different kinds of subjects exist. It is a new way of learning combined with an interdisciplinary approach. That's why some time ago there came an 'A' to STEM and it has been STEM. A is for Art and art subjects have been included in the STEM field activities. These subjects can be intimidating to some students, and they are not particularly appealing to minorities or women in the traditional sense. Many of those who do choose to pursue STEM occupations do so without having gained the critical information and skills that come from studying the arts and humanities in school. The social, fine, manual, physical, and liberal arts all contribute to and affect the traditional STEM disciplines of study, rather than being a substitute for them. Language arts, for example, serve as a vehicle for the exchange of ideas, life experiences, and points of view. Manual and physical arts have an impact on areas such as ergonomics.

It is via the visual and performing arts that society's values and directions are reflected in the past and present. The social and liberal arts provide a background for the study of attitudes, ethics, and customs. All of this is brought together in the STEAM framework, which can be defined as follows: Science and Technology, as interpreted through Engineering and the Arts, all of which are founded on mathematical aspects. The purpose of STEAM education is to teach students how to better learn and apply new knowledge by taking a transdisciplinary, reality-based approach to learning and teaching. (Yakman, G., & Lee, H. 2012).

The ultimate goal of STEAM is to assist every

student in learning and growing while also becoming a contributing member of a global village. The educational team will not have to put in any more effort because the classroom will become more naturally inclusive. While applying the new knowledge they have received from a multi-disciplinary, reality-based perspective, all students benefit from the experience of others.

Then, something new has been cited recently: STREAM. STREAM education can be defined as a unique method to learning that draws together the approaches of science, technology, robotics (including engineering), the arts (including visual arts), and mathematics (including mathematics). The technology involved in the design, construction, and operation of robots in an automated form is robotics. It is evident that students view robots as interesting both in real-life situations and virtual encounters, as such, an effort to integrate them into STEAM education should not be totally alien (Eguchi, 2014). The era of automation and robotics has already started. Simulation of surgical operations and minimally invasive surgeries, as well as the use of Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR), are all fields that have considerably enhanced medicine and surgery. As a result of technological advancements in robotics, self-driving cars in the automobile industry, automated spacecraft, and drones are all becoming viable.

There is a limited foundation in the field of engineering for the components of robotics (such as Machine Learning, Artificial Intelligence, Data Mining, and so on). It should be highlighted that STREAM education at the elementary, basic, and post-basic levels of education in underdeveloped nations may provide the necessary catalytic push for future learners in the rising field of robotics, which will benefit both the developed and developing globe. STREAM students are expected to invent, create, design, and solve problems. This strategy may provide students with the ability to discover themselves with the opportunity to improve their performance. It is our responsibility as educators to present pupils with a variety of circumstances in which they might learn about themselves. Using an encompassing mentality from STREAM, learners have the option of making mistakes, employing a variety of methods to overcome such difficulties, brainstorming on the new concept and determining the most effective technique and how to apply it to real-world scenarios. (Badmus, O. T., & Omosewo, E. O. 2020).

By seeing this, we consider that there can be more for STEM in the education field and worked on this study.

CLIL METHODOLOGY VS STEM

Another method that is similar in some respects to STEM teaching is CLIL; however, they have some differences with regard to the implementation in the current study.

CLIL, or Content and Language Integrated Learning, is a method of teaching foreign languages that focuses on the process and outcome rather than the method. The content or knowledge that students are supposed to acquire helps students learn a language (Richards and Rodgers, 2001).

CLIL is a comprehensive terminology that encompasses both learning a foreign language while studying a content-based subject like physics or geography and learning a foreign language while studying a content-based subject. (CLIL; n.d.)

CLIL has become more popular in Europe, particularly in the previous two decades, and has recently gained traction in Asian and Latin American contexts as well, particularly in the last few years (Banegas, 2011). However, as Yavuz, Öztüfekçi, Ören, Kaplan& Uzunkaya stated that while implementing CLIL is not a new trend in Turkey, there has been little research on the topic of using CLIL-based activities in the EFL teaching profession, and its role has received less attention in Turkey than in European contexts. When the first special form of high school (Anatolian High School) was established in the 1950s for selected high-achieving pupils with more intensive English classes, the goal was to employ foreign languages as the medium of instruction. However, such programs were unsuccessful because teachers lacked the essential proficiency to teach subject matter in a second language, i.e., they lacked training and education to do so. In STEM integration, the teacher does not need to be an expert on the topics. In the current study the teacher chooses her own topics to implement and she learns with the students.

CLIL might need to have more knowledge of topic area and a better level of linguistic skills. (Harrop, 2012).

It is possible that this will create an environment in which both teachers and students will feel a lack of confidence, whereas STEM implications require only interest and skills to a certain extent, which heightens the motivation, suits learners of all abilities, and provides a unique opportunity to prepare learners for global citizenship.

Earlier ideas about language across the curriculum and language-supported subject learning have been assimilated into CLIL, so it may no longer be necessary to ask which partner in the language-content relationship is the dominant partner. This is supported by the variety and number of CLIL-based projects that are currently being implemented in Europe and other parts of the world (content in English or English through content). Language and content are taught and mastered simultaneously in a dual-focused classroom environment, which is important to CLIL, and there are a number of related reasons why this would be the best way forward if the goal is to create a bilingual or multilingual society (Darn, S. (2006). In STEM integration, an inter-disciplinary curriculum is essential. The instructor can choose any topics from Science, Technology, Engineering and Mathematics and this gives the opportunity to do activities consisting of Biology, Chemistry and Physics; make students use technological tools to improve their digital skills; allow the students to build their model designs and use Mathematics in every stage of the lesson, i.e. calculation and measuring.

Interdisciplinary/cross-curricular education, which provides a meaningful means for students to use knowledge gained in one context as a basis for knowledge gained in other contexts, are the theoretical underpinnings of CLIL. CLIL invites learners to generate new information and acquire new skills through reflection and participation in higher-order as well as lower-order thinking skills according to the National Centre for Instructional Technology (Coyle et al. 2010, 54). Indeed, when students collaborate on cognitively demanding activities, they behave as if they were real research teams, generating and applying new knowledge. Consequently, advanced processing skills enable learners to transform simple information into meaningful ideas (Coyle et al. 2010) through the use of complex information processing skills.

CLIL teachers, in addition to being facilitators of learning, must maintain a steady balance between language and cognitive load (Berton 2008). According to Coyle et al. (2010) and Pavón Vázquez (2014), CLIL students are likely to have greater cognitive capabilities than they have in terms of language competency, with the result that excessive simplification of the language may lead to simplifying of the content. For CLIL classes to be successful, sufficient scaffolding is required to meet both the language and cognitive demands of the students. In STEM implementation, on the other hand, both the language and cognitive demands may remain at the same level of difficulty which makes both the teacher and the learners feel confidence. In the case of sequence words, for example, the teacher can choose six words to teach and a safe-experiment for students to undertake at home as an assignment, in which the students perform the experiment and produce a video where they talk about the procedures while using the sequence words. In this exercise, there are no significant demands on linguistic proficiency or cognitive ability.

STEM integration is different from CLIL because the main point is we integrated real STEM activities into English lessons rather than the focus on language acquisition. We teach another subject topic through English and they can improve both. However, in STEM, we present an English topic through four different subjects: through a scientific, technological, engineering, and mathematical view, and sometimes five with an Artistic view. They learn the English topic by studying its science feature combining with technology, building or designing something and adding some mathematics. Art is the most enjoyable activity in the STEM integration. This study aims to allow the students to improve 21st-century skills; to create the necessary conditions for students to be creative, innovative, and problem solvers with an improved critical thinking capacity; to provide opportunities to make them develop their design thinking abilities and present their products; to increase students' interest in English language learning and learn using it to making researches and have their science literacy.

This study was conducted in 2017 and till then any other relevant study hasn't been recognized. Thus, the study is an innovative one by bringing STEM and English together. It is aimed to break out new methods of teaching and develop the present

curriculum by combining STEM activities and English subjects.

1.1. Research Questions

1. How much do high school and low-secondary students know about STEM subjects?
2. What are the perceptions of high school and low-secondary students towards learning English?
3. What are the differences and similarities between these two groups in terms of their perceptions towards STEM and English?

2. Method

2. 1. Instruments : The questionnaire was picked to collect quantitative data, an online questionnaire which would be used to answer the research questions. The questionnaire was consisted of three sections:

I. Demographic Information
II. Level of students' knowledge regarding STEM
III. English lesson perceptions

The level of students' knowledge regarding the STEM section was the core of the questionnaire, and consisted of twenty-one questions. Twenty Likert scale questions with a 5-point scale and the participants were asked for their personal experiences with STEM; in the English lesson perceptions section the participants were asked for their perceptions towards English language learning. The questionnaire consisted of 2 multiple choice questions for the first section; 8 multiple choice questions for the second section; 6 multiple choice questions for the third section.

2.2 Participants:

The questionnaires were completed by 40 students, 20 high school students and 20 low-secondary school students who participated voluntarily. Therefore the questionnaires were conducted and analysed concurrently and the findings were mentioned in a comparative analyses style.

2.3 Procedure:

The questionnaire was distributed electronically through the Google Forms tool in order to ensure the participants were able to respond at their own convenience to the questionnaire. The survey was distributed using instant messaging tools and a link created by the Google Forms tool. It was composed in the English language.

3. Results & Analysis

3.1 Pre-Test: To see how much the students know about STEM and what their perceptions towards English are, we conducted a pre- test to the participant students.

3.1.1. Section 1

The participants were asked 2 questions to collect some general demographic information. The results of the first question show that 20 respondents answered female (50%), 20 selected male (50%) The results for this question are listed in table 1.

Table 1: Frequency distribution of general question 1

Question: How do you define your gender?
Frequency (f) Percentage (%)

Female	20	50
Male	20	50
Total	40	100%

Table 2 shows the frequency distribution for the second question. All participants (100%) selected '11th' to specify their grades.

Table 2: Frequency distribution for general question 2

Question: What grade are you in? Frequency (f) Percentage (%)

6th	20	50
10th	20	50

3.1. 2. Section 2

This segment discusses the outcomes of the level of knowledge regarding STEM concerning the first research question. It consists of eight questions where the participants choose replies as "Yes", "No" or "Maybe".

The first question's findings, as shown in Table-3, indicate that the majority of the participants haven't heard of the term "STEM" before (32 participants, 80%). The remaining participants selected the 'Maybe" response alternative (8, 20 %). None of the participants responded, "Yes" (0 %).

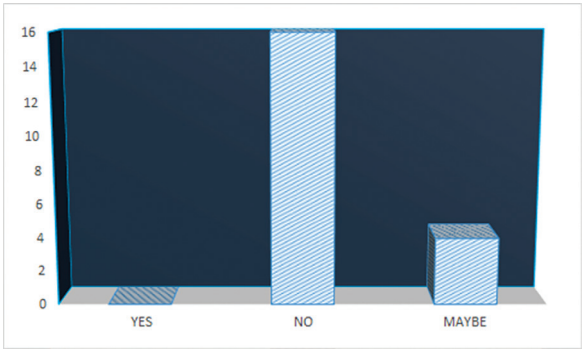

Figure 1: Have you heard of the term STEM before?

The results of the second question which were illustrated in graph 1 shows that over half of the participants (30 participants, 75%) know that S in STEM is for Science. 8 (20%) participants think that it is not for Science and 2 (5%) participants chose the "Maybe" option.

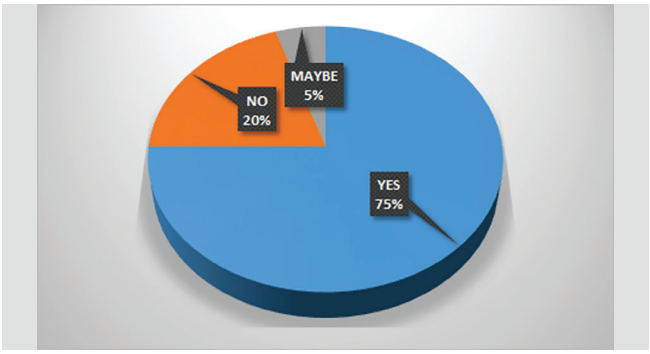

Figure 2: S in STEM is used for Science.

The third question was asking if T for Technology. The results of this question were illustrated in Graph 2. Less than half of the participants (16 participants, 40%) chose the 'Yes' option. 24(60%) participants chose 'No' and no one chose 'Maybe' options. This shows that most students do not know what STEM is.

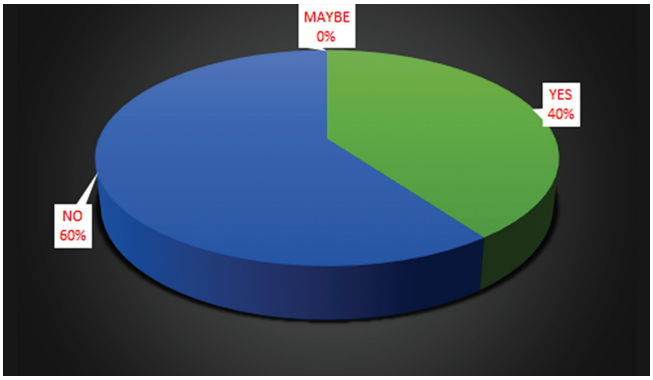

Figure 3: T in STEM is used for Technology

The fourth question was asking if E is for English. The results of this question were illustrated in Graph 3. The data from the questionnaire revealed that all of the participants surveyed (40 of the respondents, 100%) reported that E is for English. These results show that the participants have no idea about the STEM methods.

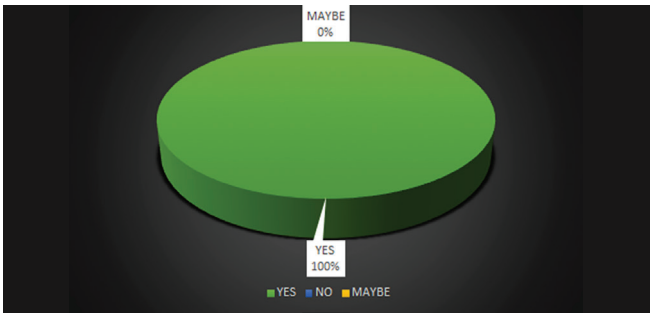

Figure 4: E in STEM is used for English

The fifth question was asking if E is for Engineering and this time most participants chose (36, 90%) replied as 'Maybe' and only 4 (10%) of them said "No". This result shows us that most of the participants were not really sure if STEM is about English or something else. The results of this question were illustrated in Graph 4.

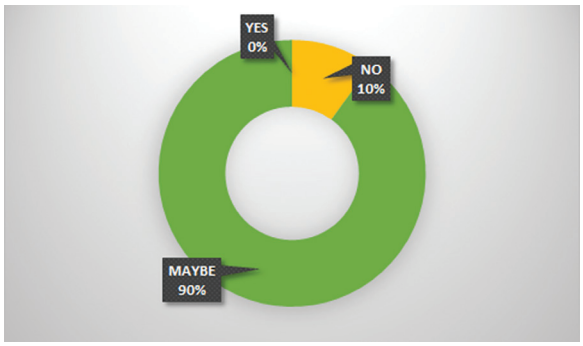

Figure 5: E in STEM is used for Engineering.

The results of the sixth question which was asking if M is for Mathematics, they all replied as "Yes".

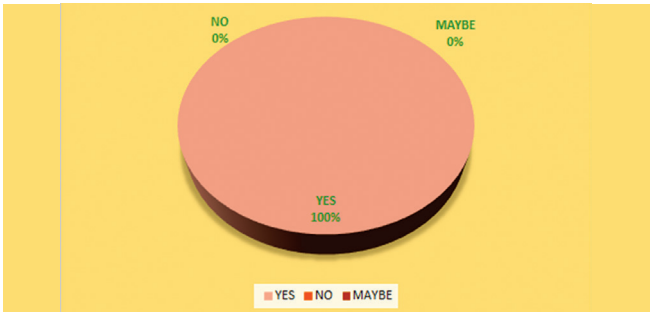

Figure 6: M in STEM is used for Mathematics.

For the last question, I am interested in learning what STEM is, half of the students (20, 50%) replied as "Yes" and only one of the participants replied as "Maybe" (5%) and the rest of the students (18, 45%) didn't prefer to learn about STEM.

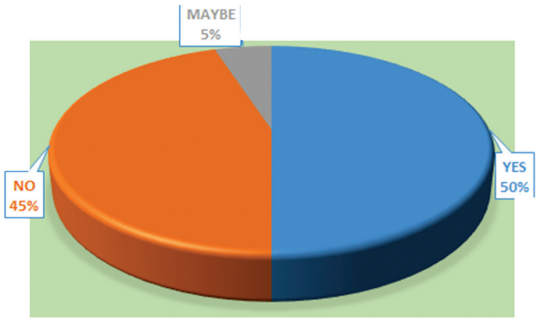

Figure 7: I am interested in learning what STEM is.

These results show that most of the students do not have an idea about what STEM is.

3.1. 3. Section 3

In the third section, five scale-questions could help provide an answer to the second research question which is asking for the perceptions of high school students towards learning English. The respondents were asked six statements. In this section the results for the analysis of the third set of scale questions are described. The results of the third section indicates a negative perception of students toward English learning.

Statement 1: English is one of my favourite subjects at school: Only a little percentage of the 11th grade students (2, 10%) agreed with the statement saying English was their favourite subject at school and most of them (18, 90%) disagreed with the statement. For the 6th grade students the situation is exactly converse. 2 of the students (10%) disagreed and all the rest (18, 90%) of them agreed the statement.

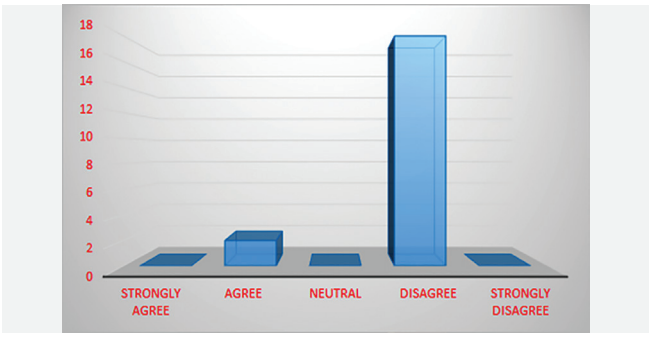

Table 4a: English is one of my favourite subjects at school (11th Grade Students)

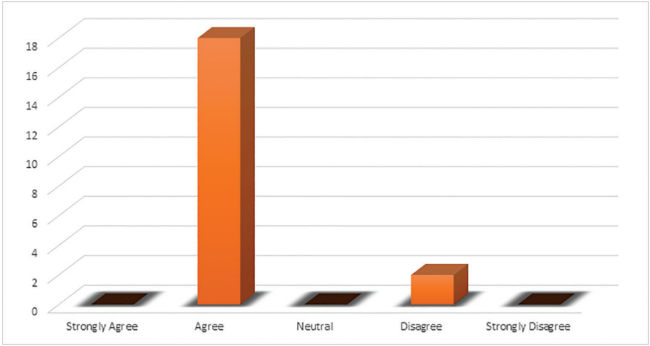

Table 4b: English is one of my favourite subjects at school (6th Grade Students)

Statement 2: English is one of the most difficult subjects at school: 2 (10%) students agreed with the sentence, 10 (50%) of them strongly disagreed and 8 (40%) of the students were Neutral about the statement. From these results we can see that most of the participants do not see English as the most difficult subject at school.

But in low-secondary school results, it was all different. 19 (95%) students disagree with the statement, whereas only 1(5%) student agreed.

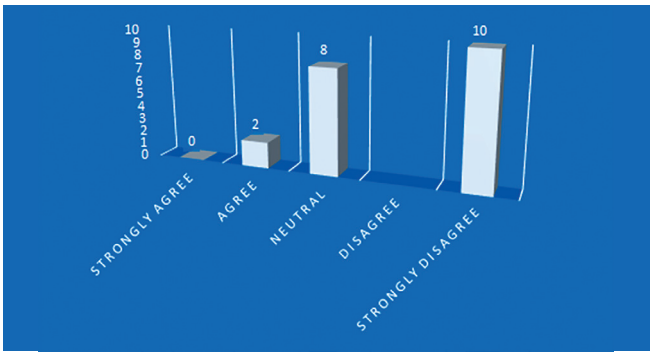

Table 5a: English is one of the most difficult subjects at school. (11th Grades)

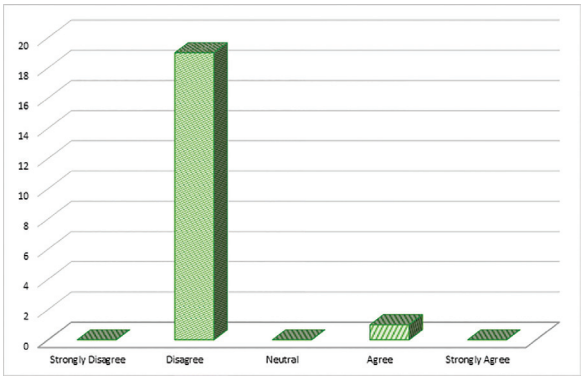

Table 5b: English is one of the most difficult subjects at school. (6th Grades)

Statement 3: I can search for information in English: A high percentage of the participants (38, 95%) of the responses "strongly disagree", only 2 (5%) of them agreed with the statement. We can clearly see that most of the learners do not trust their English knowledge when it is about searching for information.

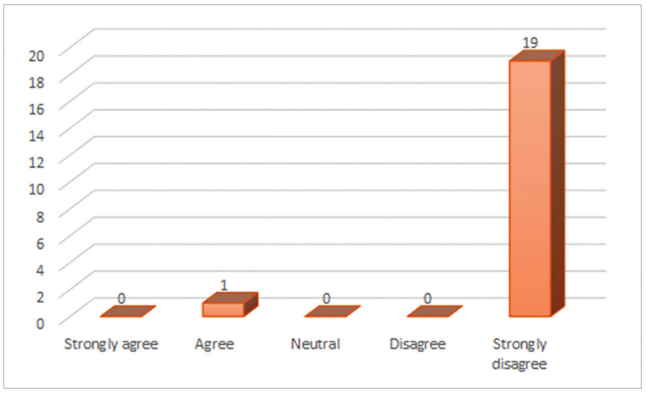

Table 6a. I can search for information in English. (11th Grades)

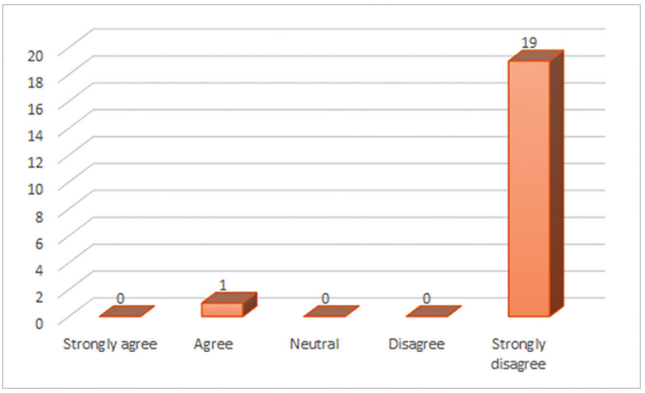

Table 6b. I can search for information in English. (6th Grades)

Statement 4: I get low marks in English: Among the respondents, a very high percentage of the 11th grade students (15 participants, 75%) indicated that they get low marks in English; only a limited part of the learners surveyed 5 (25%) of them think the opposite.For the 6th grade students, this is total opposite. Among the respondents, a very high percentage of the target population (15 participants, 75%) indicated that they do not get low marks in English; only a limited part of the learners surveyed 5 (25%) of them think the opposite

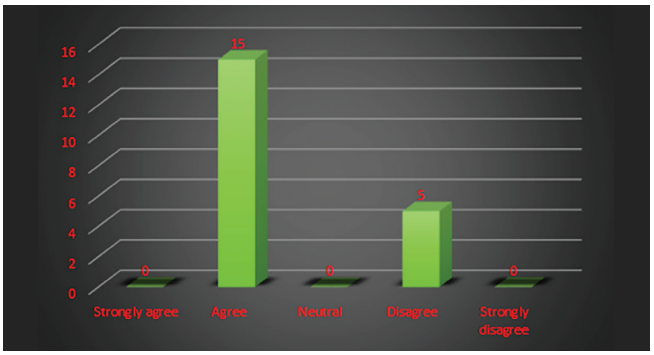

Table 7a: I get low marks in English.(11th Grade Students)

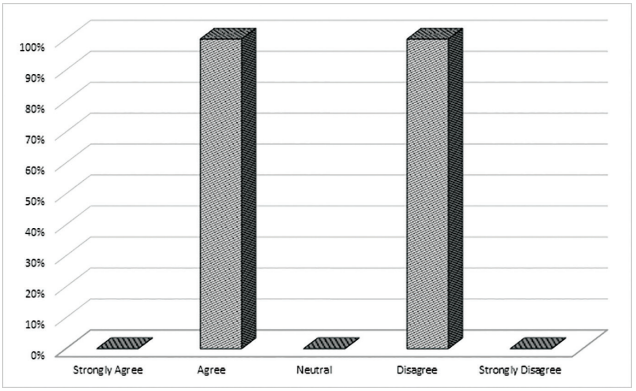

Table 7b: I get low marks in English.(6th Grade Students)

Statement 5: I think I can learn English easier with some project-based activities: Only 4 (10%) of the learners strongly disagreed with the statement. Also, a significant percentage of them 36 (90%) agreed with the statement.

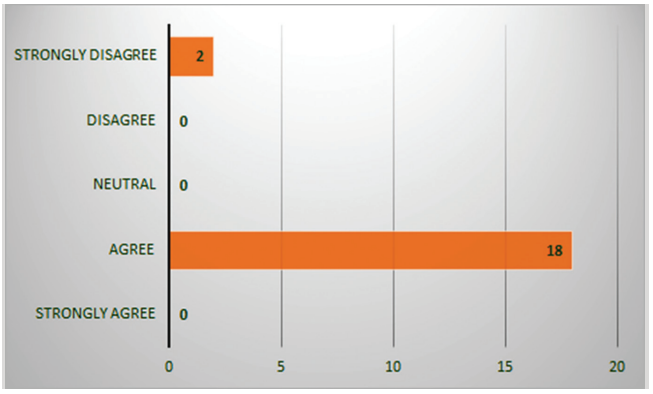

Table 8. I think I can learn English easier with some project-based activities.

From all of these results we can easily say that most of the EFL students in Turkey do not know about STEM subjects and they really need a form of

training which includes all of this information and more. In addition to this, most of the students have some negative feelings towards English subjects but they would like if there is another way of learning it.

3.2 Post- Test

To assess and evaluate the study, a post test was conducted with the same participant students. For this evaluation, qualitative data were collected. Two participant students answered the interview questions voluntarily.

K.S. (17): When the teacher first came to class with the idea of a project on STEM I thought that year was going to be a hard one to endure because there was an English teacher who wanted to teach us about Science. I, personally, always liked English and was good at it. However, it was not this year's job as we were studying for our university entrance exam for the following year. She wanted us to talk about space and told her what we knew about space travel. We had limited information about these topics and as one can predict, we said only 'it is possible one day, but not today'. We assumed that she was talking about going to Mars. Then she asked if we knew NASA. That was the moment I got a bit excited. What was happening? When she said we would talk to a NASA worker we couldn't believe that was going to happen. But he was there. He was directly talking to us. Weeks after, the English lesson became more attractive for all of us because every week we did something new and much related to our subjects. I will never forget my STEM 'E' for English experience.

S.H. (12): I used to hate English because I was never good at speaking English. I didn't have the confidence to talk to anyone in English. But, after our project, I realised that everybody can speak English, it was not so hard as I thought. And one more thing, I have chosen my future job thanks to my teacher. I was confused about my future career, but thanks to the project I involved, I know what I want now. I want to be an environment engineer.

4. Findings and Discussion

A 16 questions- pre-test was applied to evaluate their interest in English and STEM activities. It was seen that 11th grade students were not interested in learning English, they thought that they could learn it after entering the university which was a compulsory thing to have a good job in the future, and they had no idea about STEM or related subjects.

The 6th grades, on the other hand, were much more interested in learning English and STEM subjects. The activities were the same in both grades, just the level of English was B1 level for high schoolers and A1 level in the low-secondary grade.

In the Global Warming- Renewable Energy activity, new vocabulary was studied about Global Warming; i.e. global warming, climate change, blanket, atmosphere etc. for the 6th grade students. The differences between Global Warming and Climate Change was explained. There was a project-based activity for the 11th grades where they built their model buildings and prepared some posters to raise awareness to Global Warming. We prepared a design contest where they can use waste materials such as toilet paper rolls. They were free to choose the materials and design buildings or some other stuff for a contribution to save the world and retain a sustainable environment. They built their model buildings and prepared some posters to raise awareness of Global Warming.

In the Augmented Reality activity, some videos were shown about the topic. The 6th grade students were introduced with the Aurasma, Quiver and scnAR programmes. They experienced creating an Aura using a video and picture. They used their mobile phones to create images. They created some flashcards for vocabulary about Planets. When they showed the photo of the planet, there appeared an informative video about it. The 11th grade students did more complex jobs like advertisement tools, interactive photo albums.

In the Nanotechnology activity, some terms were introduced as new vocabulary for the 6th grades. Some videos and presentations were shown to the 11th grade students. All the students made some projects as assignments about the topic. There was again a project-based activity where the students created some new products. For example one of the 11th grade students designed a Nano-jacket for military purposes. This jacket changes its colour according to the area and weather conditions in which it is worn. It keeps the person who wears it warm and cool according to the temperature. It sends signals to the emergency physicians if the person gets some medical issues such as arrhythmia or hypothermia.

In the SCIENTIX Project/ STEM Discovery Week activity, the SCIENTIX project was introduced. Low-secondary students didn't attend this event because the age and level of them were not suitable for this activity.

The findings indicate that the majority of the 40 participating (20 high school and 20 low secondary school) students did not have a clear idea about STEM or related subjects, or the importance of these subjects regarding their future careers. The second section of the pre-tests showed that the high school students' way of thinking about English was very pessimistic and they found studying, understanding and using English as too difficult, while low-secondary school students found studying and learning English and STEM very enjoyable and easy.

According to the findings, the interview which was conducted for a post-test purpose clearly demonstrated that in the course of the project process, all the students had fun, they were astonished by the new knowledge that they gained, and they were interested in making research and discussing their findings. When the project ended, they answered the questions in a positive manner in the post-test. It was seen that they loved English more and their marks became higher and STEM was not so complicated for them anymore. With this regard, one can see that this project has changed the views of the students.

The researcher, as the conductor of the project, was anxious at first because she didn't know whether the project activities would work or not, as the teenage students had really negative attitudes towards English and they hadn't heard about STEM before. But, as the project started, it was seen that they started to enjoy and become great investigators. After seeing the improvement of the students, the study proved its necessity.

CONCLUSION & SUGGESTIONS

As previously stated, STEM education and English are two critical subjects for our future generations. Projects, studies, and classroom activities, such as the one presented here, are excellent ways to integrate these subjects into a variety of different types of school subjects.

In this section, the researcher provides some suggestions for EFL teachers for the future implementations with a younger age group.

For the Deep Space activity, younger students can be introduced to the names of the planets and some basic features of our Solar System. There are numerous song and story videos available on online video platforms such as YouTube, which can be used to create some warm-up activities.

Atoms, elements, and some basic vocabulary can be taught during the Particle Physics activity. Online video resources may be beneficial for younger students.

For the Coding activity, certain online tools or websites are child-friendly. While Scratch is an excellent tool for young coders, Kodu Game Lab is another option.

Numerous enhancements and adaptations could be made to the Global Warming-Renewable Energy activity for young learners. They are extremely inquisitive about our world. They genuinely care about the environment in which we live, the animals, and the weather. There are numerous story and song activities available online.

Teachers would be wise to prepare some flashcards for young learners and use them as materials for their vocabulary teaching activities or for some simple grammar structures such as tenses in the Augmented Reality activity. Creating AR materials may be challenging for these students.

In the Nanotechnology activity, some informative but beginner-level English videos may be more appropriate. Additionally, because young learners are extremely creative, teachers can develop some design-based activities related to the topic.

The current study, as a project, was chosen by the European Schoolnet as one of the top 30 activities out of 800 across Europe. The European Schoolnet presented it throughout Europe and at the 23rd Science Projects Workshop in June 2018 in Brussels.

The study is ground breaking in its field, innovative, and novel. It is adaptable to learners of any level and age. The EFL teachers are responsible for developing new activities, modifying existing ones, and adding to the project, as they are the best experts on their students' needs and interests.

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Multi Culture in Education

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Abstract

Nowadays with the influence of globalization, multicultural education plays a very important role during English lessons. Foreign language itself promotes close attention to the way of life of the country in which language is studied. Students learn not only English grammar rules, but they receive the introduction to the way of thinking of foreigners, namely British nations. In other respective, if the person has good communicational skills and a high level of English, and wants to combine it, e.g. while studying or working abroad, so then multicultural education is inevitable.

Keyword: Multi Cultural, English Leason, Education

INTRODUCTION:

Multicultural education embraces any form of education or teaching that includes texts, values, beliefs and outlook of people from different cultural backgrounds (Banks, J. A.,1995). There is an assumption that the ways in which students learn and think are strongly influenced by their cultural identity and history. Experts in multicultural education also point out that to teach culturally diverse students productively requires educational methods that value and recognize their cultural backgrounds (Edglossary,2008). Therefore, the main idea of the multicultural education is to improve learning conditions and atmosphere for all students, in particular students from cultural groups that have been historically discriminated or who constantly experience lower educational achievement and attainment (Edglossary,2008).

Multicultural education sets specific goals and form strategies to achieve them (Pohan, C. A.,1996). The core goal is giving students the possibility to gain knowledge which is necessary to take personal, social and civic action in order to promote democracy and democratic living. It helps to develop a sense of personal and civic efficacy, faith in their ability to make changes in the institutions in which they live, and situations to apply the knowledge they have learned (University of Washington, 2021).

Such practice is easier to implement when people are studying the humanities. Although if the teacher has the motivation and is interested in promoting multicultural education it is possible to organize while studying other disciplines.

EMBRACING MULTICULTURAL EDUCATION

There are several practical ways how to introduce multicultural education. Action activities and projects should be tailored to students' cognitive and moral development levels (Timperley H et al, 2007, Lickona, T., 1978). Students in the primary grades can take action by promising not to laugh at ethnic jokes, while students in the early and middle grades can take action by reading books about various racial, ethnic, and cultural groups (Grant, C., & Sleeter, C., 2006). Upper-elementary pupils can make friends with students from various racial and ethnic groups, and they can participate in cross-racial activities and projects with children from other schools in the city. Upper-level students

can also get involved in projects that aid and soothe persons in the community who have special needs. They can also participate in local political activities such as school bond elections and elections on local initiatives (Grant, C., & Sleeter, C., 2006).

Going back to English classes, pupils or students who learn the English language are directly and sometimes unconsciously connected to multicultural education. The important task of the teacher is to show diverse cultural points, help to overcome a fear of foreign culture and communication with them, foster intercultural understanding and positive relationships between students from all cultural backgrounds. Such kind of involvement is beneficial because it provides programs promoting anti-racism and community harmony.

There are several ways which teachers can use to implement multicultural education in the classroom and which is important to remember because it is not always easy to change strict beliefs or misconceptions of people. Teachers should understand they may be working with students from many backgrounds who may have biases against one another for cultural, racial, ethnic, or religious reasons (American University, 2020). To cultivate safe and productive learning environments, teachers should be aware of any bias and work toward breaking it. Furthermore, it's essential for educators to value their students' experiences. Allowing students to share their own stories or those of family members with their classmates is beneficial at least because of two goals: providing validation for the students who share similar experiences and introducing students to new perspectives (American University, 2020).

Teachers can promote fair learning by being aware of their students' various learning styles, which can be influenced by their backgrounds and upbringing. Some students may be visual learners, others tactile learners, or auditory learners (American University, 2020). Teachers can encourage students to learn from one another's experiences and to ask clarifying questions. Through lessons and projects, teachers can emphasize the value of having students from many cultural backgrounds represented in their classes. All students can engage with these authentic reading, writing, and problem-solving experiences (American University, 2020). The method of interviewing family members is also possible and quite interesting to use.

MULTICULTURAL EDUCATION & THE CURRENT STUDY

In Ukraine, multicultural education is not paid much attention. The communication between Ukrainian people and foreigners is kind of limited although there are a good number of foreign students. There are separate groups for studying at universities. On one hand, such practice is necessary because of the different educational levels at school. This situation may result for Ukrainians in following social and psychological factors – fear of foreign culture, false misconceptions, and fostering prejudice. If talking about foreigners, so they may face wariness, unfriendliness, cold distance, and distrust in society. Multicultural education provides opportunities to overcome these problems.

In the present study, during English lessons students were allowed to share their own stories or those of family members, encouraged to learn from one another's experiences, and ask questions that promote understanding, watch videos that open eyes to the world of British, American, German culture.

CONCLUSION

To sum up, I would like to point out that it will be a long process for teachers to implement multicultural education in their lessons in Ukraine. It requires reformation of the program and personal view on the organization of the world. But this is a new necessity which brings its benefits. If students learn from a young age how to accept differences, they are unlikely to develop prejudice toward people of a different race or ethnicity. When students broaden their view of the world from the side of the diverse groups that shaped historical and develop contemporary events, they will faster take part in personal, social and civic actions that are leading for citizens in a democratic pluralistic society.

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Stem-Career Orientation Amongst Vietnamese Secondary Students

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Abstract

Efforts to improve STEM have been worldwide on the rise. Considering that, professional tendencies are revealed at early ages, determining students' interest in STEM careers is of importance for Vietnam's workforce. Cole Ray and Zanetis (2011) state that when students show interest in a career path, it is essential to supply them with information allowing them to envision their future career in general and daily responsibilities and wage in particular. The study of "STEM-career orientation amongst Vietnamese secondary school students" is to find out the factors deciding careers and the level of preference in any STEM fields in the eyes of Vietnamese youngsters. The purpose of the study is to conduct the STEM Career Interest Survey (STEM-CIS) with 44 questions (created by Meredith Weaver Kier, 2013) in all STEM fields. The research is under quantitative methods conducted with 523 students in different secondary schools in Vietnam (448 public schools and 75 private or semi-public schools in both rural and urban areas) and uses SPSS to analyze all the data. The study results show that (1) more male than female students tend to choose Engineering and Maths, (2) more urban than rural students choose Technology as their future careers, (3) students in private or public schools also define their careers as Technology, (4) students approaching STEM courses understand and have their interests in Science and Maths more than students who have never been engaged with STEM education, and (5) students' career orientation is not affected by the choice of their parents.

Keywords: STEM education, STEM-career orientation, STEM-CIS

INTRODUCTION

STEAM (Science, Technology, Engineering, Art, Mathematics) disciplines involve creative procedures for educational inquiry and investigation. The U.S. Department of Education and Michael Miiligan, CEO and executive of ABET pointed out that STEM and STEAM skills should be considered to be important knowledge as they contribute to the prosperity and sustainable development of a country, especially in solving societal issues such as the public health sector during Covid crisis.

Microsoft Corporation studies reported that, nearly 80% of college students in STEM said their STEM orientation was formed since they were at upper and lower secondary schools. Also, 21% of students surveyed stated that they decided to follow their interest in STEM from lower secondary and elementary levels. However, just around 20%

of STEM college students feel that they were fully-equipped with STEM knowledge in K-12 education program. Interestingly, there exist the remarkable differences in the number of male and female working in STEM fields. The diversity in STEAM can be illustrated as follows: women and minorities have traditionally been under-represented in such science and technology-oriented disciplines such as engineering, mathematics, cybersecurity, data science, STEM and STEAM. This inequity has been addressed actively these days. All considered to be very useful in preparing secondary students to orient their future career as STEAM has gained popularity among educators, parents, administrators, corporations and other critical thinking skills.

STEM/STEAM-focused education is pivotal for a country like Vietnam to thrive further. Dr. Bui The Duy (Deputy Minister of the Ministry of Science and Technology) believes that Vietnam has been left behind in the development race. He considers STEM/STEAM education a pivotal foundation for Vietnam to develop, especially when the roles of science and technology in various industries are now focused. The assistant Dean of University of Science, Dr. Tran Minh Triet, stated that STEAM education has become popular in Vietnam. Yet, there has to be a clear teaching method for STEAM in the current school system. STEAM/STEM education in Vietnam, therefore, plays a significant part in generating a young skillful generation. Digital literacy and flexible learning to acquire knowledge on STEM/STEAM should start at an early age and continue through the entire school years, so that students can practice and acquire the skills for employability in the future.

The study of "STEM-career orientation amongst Vietnamese secondary school students" is to find out the factors deciding careers and the level of preference in any STEM fields in the eyes of Vietnamese youngsters. The purpose of the study is to conduct the STEM Career Interest Survey (STEM-CIS) with 44 questions (created by Meredith Weaver Kier, 2013) in all STEM fields with five research questions: (1) Is there gender equity in choosing STEM as a career? (2) Is the number of students choosing STEM careers the same in urban and rural areas? (3) Do students in private and public schools share the same points of view on career orientation? (4) Does knowledge on STEM/STEAM affect the choice of career? and (5) Do parents have any impact in the choice of future careers amongst students of secondary schools?

LITERATURE REVIEW

In the long search for STEM-career orientation, many different approaches, or methods have been devised thoroughly. Many countries are now struggling in recruiting more individuals into science, technology, engineering, and mathematics industries (Hill et al. 2010; Regisford. 2012). Countries such as Austria, France, Germany, Honduras, Mexico, The Netherlands, and Switzerland found it so hard especially during the recent economic recovery with few individuals trained in using and empowering technological capability in processing domestic production (Schwab and Sala-i-Martín 2012). Various reports suggest the reasons of students not choosing STEM as their careers, including a lack of quality preparation in mathematics and science in K-12 educational systems, lack of access to money and technology, lack of guidance from experienced adults with STEM careers, psychological barriers and lack of role models in the fields (Drew 2011; National Academy of Sciences, Global Affairs & Institute of Medicine 2011; Scott and Martin 2012). In the studies in STEM interest amongst K-12 students, VanLeuvan and Wells et al. showed a decline while Foulad et al and measured the reasons for students' favour in STEM-oriented careers in a few studies . Institutions operating in the field of educational sciences claim that specialization in STEM careers and interest in those careers should start in middle school (Kier et al. 2013). Super stated that students at lower secondary schools begin to recognize careers of own tastes and abilities. Research has also shown that students' choice of careers is shaped at the level of secondary school (Tai et al. 2006). In addition, Dejarnette (2012) mentioned that in some studies, elementary school students' perceptions and plans are influenced by STEM activities in positive ways.

METHODS

HOW THE STUDY WAS CONDUCTED

The number of studies related to STEM education has considerably increased due to the importance attached to this topic in recent years. On the other hand, the shortage of human resources in the STEM field promotes the understanding of the causes

and factors affecting students' future STEM career choices. To answer our questions, this research will flow steps as stages 1–5:

Stage 1 Adapt STEM-CIS in Vietnamese

Stage 2 Preliminary pilot testing of items, and perform for confirmatory factor analysis and test reliability

Stage 3 Conduct random STEM-CIS survey among secondary school students

Stage 4 Data collecting and processing

Stage 5 Analyze results and make recommendations

The study design

This is a quantitative research study employing a survey model. It basically aims to describe the properties of a group, such as its personal self-efficacy, capabilities, ideas, attitudes, beliefs, goals, outcome expectations and levels of knowledge.

SUBJECTS OF RESEARCH

The subjects of research are 523 middle school students from 18 different provinces of Vietnam. At first, data were collected from 1058 students at 23 middle schools. For all students, it was the first time they had seen the items. Students took the survey online. Convenience sampling method was used to determine the sample in this research. Table 1 shows the demographic of students participating in the survey.

Table 1. Demographic of the students participating in the survey

Variables	Groups	n	Variables	Groups	n
Gender	Girl	281	Grade levels	6	114
	Boy	242		7	139
Region	Rural	209		8	146
	Urban	314	Educational	9	124
Level of participant in STEM class	Joined	186	status of parent	High school	255
Type of school	Not yet	337		University	207
	Public	448		Other	61
	Non-public	75			

Since the research was performed at gender was analyzed in two categories such as girls and boys; region was analyzed in two categories such as rural and urban; level of participant in STEM class was analyzed in two categories such as joined and not yet; types of school was analyzed in two categories such as public and non-public (private); grade levels were analyzed in four categories between sixth and ninth grades; parents' educational status was determined in three categories as high school, university, and above.

These independent variables were qualitative and discontinuous.

Data Collection Tools

The online survey was conducted to collect data among middle school students. This survey has two parts, such as Personal Information Form and STEM Carreer Interest Survey (STEM-CIS).

Part 1, the Personal Information Form was prepared to determine the demographic properties of the gender, region, level of participant in STEM class, type of school, grade levels and parents' educational status.

Part 2, STEM-CIS was used in determining students' interest in STEM careers. It was developed by Kier et al. (2013) based on Bandura's social cognitive learning theory. The Vietnam version of the survey consisted of four subdimensions (science, technology, engineering, and mathematics) and 44 items (which have been adjusted to suit the Vietnamese context). It has been completed after the process of adaptation, test pilot, and performance for confirmatory factor analysis and test reliability. The measurement reliability was found to be 0.93 for STEM-CIS and 0.898, 0.907, 0.932, and 0.935 for the sub-dimensions of science, technology, engineering, and mathematics, respectively.

DATA ANALYSIS

The data was analyzed on the Statistical Package for the Social Sciences (SPSS) software version 21. Mann Whitney U test was used to analyze the STEM-CIS scores according to gender, region, type of school, and level of participant in STEM class. The Kruskal Wallis H test was used to check for any differences between STEM-CIS scores by parents' educational status.

RESULTS

STEM-CIS scores were consisted for any significant differences according to the demographic variables (gender, region, type of school, level of participant in STEM class, and parents' educational status)

GENDER AND STEM-CIS

Table 2. Mann Whitney U test results for STEM-CIS scores according to gender

2 groups: girl, boy

Test statics	S	T	E	M
Mann-Whitney U Wilcoxon W Z	31366.500 70987.500 -1.583	31224.000 70845.000 -1.705	29668.000 69289.000 -2.732	28638.000 68259.000 -3.272
Asymp. Sig (2-tailed) η^2	0.113	0.088	0.006	0.001

The results showed that the students' scores for their interest in engineering (η^2 = 0.006, p < .05) and math (η^2= 0.001, p < .05) careers differed in favor of the boys. By contrast, the scores for the students' interest in science (η^2 = 0.113, p > .05) and technology (η^2 = 0.08, p > .05) did NOT differ by gender. There is no gender equity in choosing STEM as a career in engineering and math.

REGION AND STEM-CIS

Table 3. Mann Whitney U test results for STEM-CIS scores according to region

2 groups: rural, urban

Test statics	S	T	E	M
Mann-Whitney U Wilcoxon W Z	32155.000 54100.000 -0.402	28393.000 50338.000 -2.762	30953.000 52898.000 -1.194	31174.500 53119.500 -1.018
Asymp. Sig (2-tailed) η^2	0.687	0.006	0.233	0.309

As revealed in Table 3, students attending school in the urban areas had more interest in technology (η^2= 0.006, p < .05) than those enrolled in the rural areas. On the other hand, their interest in science (η^2 = 0.687, p > .05), engineering (η^2 = 0.233, p > .05), and math (η^2= 0.309, p > .05) did NOT differ according to the place in which they lived.

TYPES OF SCHOOL AND STEM-CIS

Table 4. Mann Whitney U test results for STEM-CIS scores according to types of school

2 groups: public, non-public

Test statics	S	T	E	M
Mann-Whitney U Wilcoxon W Z	14678.500 115254.500 -1.813	14378.500 114954.500 -2.115	15751.500 116327.500 -0.940	16189.500 116765.500 -0.530
Asymp. Sig (2-tailed) η^2	0.070	0.034	0.347	0.596

As shown in table 4, students studying in non-public schools had more interest in technology (η^2 = 0.034, p < .05) than those enrolling in public school. However, the type of school did not affect students' interest in science (η^2 = 0.070, p > .05), engineering (η^2 = 0.347, p > .05), and math (η^2= 0.596, p > .05).

PARENTS' EDUCATIONAL STATUS AND STEM-CIS

Table 5. Krukal-Wallis H test results for STEM-CIS scores according to parents' educational status

3 groups: high school; college, university; others

Test statics	S	T	E	M
Kruskal-Wallis H df	4.015 2	4.193 2	1.520 2	1.660 2
Asymp. Sig (2-tailed) η^2	0.134	0.123	0.468	0.436

Table 5 showed that students' interest in STEM careers did not differ according to their parents' educational status showing that this variable did not influence their interest in STEM careers.

LEVEL OF PARTICIPANT IN STEM CLASS AND STEM-CIS

Table 6. Mann Whitney U test results for STEM-CIS scores according to level of participant in STEM class

2 groups: joined, not yet

Test statics	S	T	E	M
Mann-Whitney U Wilcoxon W Z	19959.500 76912.500 -7.122	30570.000 47961.000 -0.493	30229.000 87182.000 -0.730	23384.000 80337.000 -5.057
Asymp. Sig (2-tailed) η^2	0.001	0.622	0.465	<0.001

Table 6 reveals that students who joined STEM class had more interest in science (η^2 = 0.001, p < .05) and math (η^2 < 0.001, p < .05) than those who had never studied in STEM class. In contrast to this, students' interest in technology (η^2 < 0.622, p < .05), and engineering (η^2 < 0.465, p < .05) did NOT differ according to the level of participants in STEM class.

CONCLUSION

The research found that students' interest in STEM careers varied by gender, region, school type, and grade level, but it did not vary significantly in parents' educational level.Male students tend to be into engineering and math careers more than female students. However, no differences were found between boys' and girls' interest scores for mathematics careers.

The findings obtained demonstrated that students in urban areas tend to choose careers related to technology more than students in rural areas. By contrast, interest in science, engineering and math careers did not differ according to region. This research showed that non-public school students tend to choose technology careers more than public school students. However, interest in science, engineering, and math careers did not differ according to type of school.It was also found in this research, students who have attended STEM classes tend to choose careers related to science and math, many students have never attended a STEM class. On the other hand, interest in technology and engineering careers did not differ in relation to the level of participants in STEM class scores. Another finding from this research, students' choice of a STEM career field involves social perceptions of self-efficacy, outcome expectations, goals, interests, family support, and personal inclinations.

Limitations and suggestions

This research had limitations in terms of the number of samples. In further work, qualitative studies can be performed in the future to obtain detailed results. Researchers can focus on other variables (such as the place of residence, grade levels, family income level and end of semester grades).

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Challenges And Opportunities of English Language Teaching at Secondary Level in Bangladesh During COVID

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Abstract

English Language Teaching is always challenging in Bangladesh at secondary level. This challenge is elevated due to sudden exposure to COVID 19 with the creation of some new windows of English Language Teaching. This study represents the challenges and opportunities that crept into English Language teaching of the teachers of the Secondary level of Bangladesh due to COVID 19 following a survey method. The analysis of the respondents feedback clearly show that a remarkable affinity to learning through online applications like Facebook Live, Zoom, Whats App Group, Microsoft Team, Google Meet etc. However, the task at hand both the teachers and the students are not easy. Most important and crucial factor was internet connection, devices like laptop, smart phone at home, so they were forced to adopt to a varied ways of teaching-learning and so on. About 78% used interactive online tools which made them happy & they expressed post COVID ELT practices in Hybrid mode. Poor internet connection, digital device issues with satisfactory level of attendance were the biggest challenges shared by the respondents. Despite of allowing many windows of teaching & learning English through online during COVID, about 78% reported about the less learning than their regular practice of face-to-face instruction and also agreed on affecting mental wellbeing for both teachers & students. COVID induced new teaching strategies develops a new dimension of English language teaching & learning at secondary level in Bangladesh which might be nurtured for eradicate some common existing challenges in learning English at present.

Keywords: English Language Teaching, Bangladesh, COVID 19.

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INTRODUCTION:

The Covid-19 pandemic has a major impact for many students around the world. No doubt, it is one of the burning issue in the world. The virus has rapidly throughout the world though the first human case of Covid-19 was reported in China (Islam et al., 2020). This pandemic has already engulfed every aspect of our live including education which is one of the basic needs of the nation. According to the World Economic Forum (2020), globally; over 1.2 billion children are unable to attend the classes as a result of this pandemic. Our country, Bangladesh has suffered a lot and the situation remains unchanged. There's huge damage in the education sector in Bangladesh. Nearly 500 days schools are

closed while online education is largely treated as an optional means of education during the crisis. The pandemic period forced it to secure the position of being the central mode of learning. Therefore, no live platforms are currently used by educational institutions to support the learning process of students. (Mulyanti et al., 2020).

In the wake of the Coronavirus Pandemic, online schooling has opened a new frontier in Bangladesh education system, recently used as an alternative solution to cover loses in the education field. Teachers get familiar with the online technology and tools. They develop themselves for their own interest or are bound to cope with the situation. But lack of sufficient resources and adequate teacher training is insufficient access to technology, late adaption of learners online learning, lack of technology facilities in rural areas are the most frequently faced obstacles in online education (Al Amin et al, 2021 ; Badiuzzaman, M. et al , 2021; Rizalin A. Francisco, 2021).

English language teaching was always a big challenge for a country like Bangladesh at secondary level. The success rate of public exams at secondary level mostly depends on this subject and in rural areas students fear on English learning has been focused many times. Before the COVID, the type of challenges were lack of skilled teachers, appropriate books & resource materials, almost no scope of practice at home, taking English teaching or delivering instructions in native language and many more (Hoque, Md., 2009; Rahman, M.M. et al. , 2019; Moses, R. and Mohamad, M. ,2019). Sudden exposure to COVID allowed immediate shut down of face to face instruction without proper preparedness for the next steps. At the very early stage pre-recorded English language classes through state owned Government Television channel " Sangshad TV" was introduced followed by Radio programs. This approach faced many challenges like non-interactive method of teaching and learning, access to television, students motivation, frequency of classes and many more. After a few months later of this approach, few schools, mostly from urban areas, initiated online learning through which with regular subject teaching, English language teaching was continued.

Like most of the teachers in Bangladesh, the English language teachers were not familiar with the online teaching and learning which created some obstacles at the early stage of the new journey but surprisingly those who explored in online media were came to overcome the situation with lots of English language tools in online. Teachers introduces many tools and resources to their students which showed good performances at some points than the traditional methods of language teaching. Being a developing country with a limited number of internet coverage and financial constrains at the rural areas were shown the big challenges to introduce the new intervention. In addition to that reluctant of few senior teachers towards new technology was also another challenge of this issue.

A good number of studies have been reported on online teaching strategies, its trends, challenges and ways to overcome the challenges but a very limited study was reported focusing the online teaching of English literature, especially in Bangladesh at secondary level. Thus, this study focuses to address the gaps through which a clear picture of the challenges & opportunities of English Language teaching has been drawn through a survey among the English language teachers, students, parents in Bangladesh dealing with secondary level.

METHOD

The study utilized the mixed method which is the integration of survey method as well as FGD followed by some interviews to gather quantitative as well as qualitative data. The population of this study was the English Language teachers, students and parents of secondary level of Bangladesh. The respondents were selected through purposive sampling and a total of 378 respondents participated in the study .

Participants and design

Participants were recruited among the students, their parents, and English language teachers at secondary level of Bangladesh. The measurements consisted of questionnaires, which were handed out upon recruitment. Upon agreement to participate, participants were asked to fill out a questionnaire. The purpose of the interview was to find out the actual challenges focusing the objective of the study and also getting some areas as opportunity.

The study was conducted among 195 students at secondary level, 6-10 grade with random sampling. 76 parents and 107 English language teachers

from all the corners of the country took part in the survey, FGD & direct phone interview focusing the questionnaire set by the research plan. Most of the data was collected vis Google form feedback, 3 FGD & 28 phone calls were the part of the study.

RESULTS

A mixed method study on the issue addressed here reflects some qualitative as well as quantitative data.

Qualitative Analysis

FGD & telephone interview with the students, parents and English language teachers showed the following information as the qualitative feedback-

- English language learning is still now a difficult task for most of the students in rural areas.
- Classroom environment should be created to make the learning more fruitful.
- Teacher centered classroom is not allowing student's to speak in English during class time.
- Most of the English Language teachers are not delivering their lesson in English.
- Large classroom size is another challenge.
- English language teachers are not technologically sound enough to explore online resources and tools which can be used for their online classes.
- Incorporation of technology in English language teaching giving better output than the traditional methods of teaching but it requires excess time for a teacher to make the lesson or instruction ready.
- In traditional system, parents were not found enough resource materials for their son/ daughter for their language practice at home but the online resources enables them a lot which is showing better output.
- YouTube videos, free mock testing options and also some specific websites like American English, Voice of America received highest appreciation by all the respondents towards English Language learning using online media.

In response to a question "What recommendation would you like to put to meet the challenges" the responded shared the following feedback:

- Orientation with the devices and enrich the technological expertise of the stakeholders,
- Providing proper resources and more interaction and communication by easy access.
- Strong connection must be ensured among students, parents, school and teachers using phone or social media.
- Students must be attracted using different attractive features of ELT with different technology to increase attendance.
- For summative and formative assessment interactive and noninteractive tools can be used.
- Blended teaching - learning approach, PBL and STEAM method, can be introduced
- Awareness of guardians on technology centered ELT & learning
- Making the class enjoyable with student centered learning management tools
- Free Internet Access (for financially constrain students) for all levels of students for a certain period of time of the time
- Change is assessment system
- Professional development and support, financial help and Up to date teaching learning
- Need to familiarize with the online education.

Quantitative analysis

This study finds many quantitative data for the better reflection of the objectives of the study which includes both challenges as well as opportunities of online learning of English language during COVID. The quantitative scenario of the study is shared below-

a) Information of the respondents: Out of the total respondent 55.6% were male and 44.4 % were female, indicating a close gender balance-based study. About 78% of the online respondents were from urban areas as because of their easy access to internet and also the good internet bandwidth.

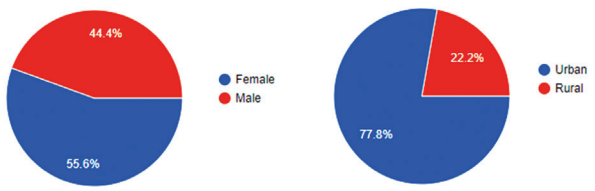

Fig.1: Gender & area wise respondents' percentage

b) Strategies taken during COVID for ELT: During pandemic, since face to face instruction didn't worked thus those institutions and teachers who moved to online expressed their feedback for shifting their practice from offline to interactive online, about 78%. About 44% expressed their status on online assignment-based study method and almost same reflection was shown by non-interactive online methods like YouTube video, website based, Facebook live etc.

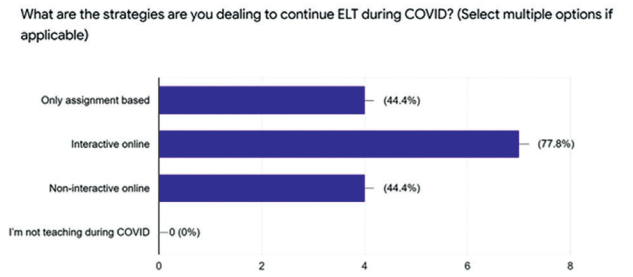

Fig.2: Strategies applied during COVID by ELT: respondent feedback

c) Challenges on ELT during COVID: Although a number of approaches have been addressed to deal with the English language teaching & learning during COVID but about 55% respondent agreed strongly that ELT during COVID was challenging.

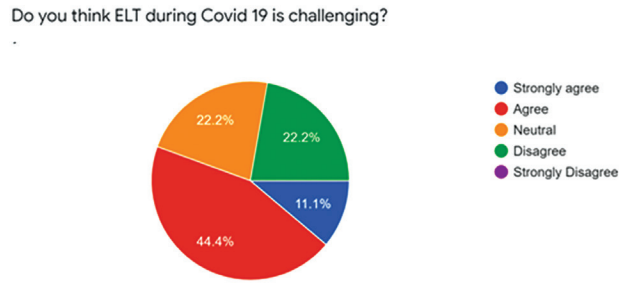

Fig.3: Respondent's feedback on their opinion on ELT

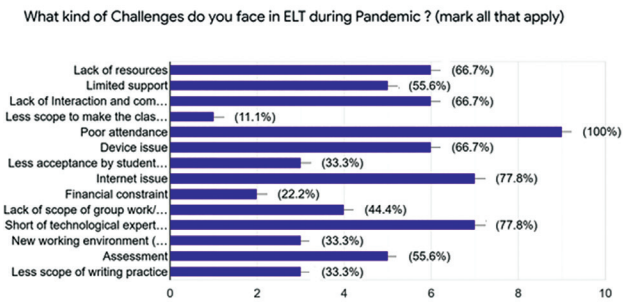

Fig.4: Gender & area wise respondents percentage

The type, nature & frequency of challenges were varied with the change in gender, locality & institution. A summary of the survey feedback has been shared in Figure 4 where it shows that poor attendance (100%), internet issue (77.8%), short of technology expertise were the prime challenges with other challenges listed.

d) Competence in online ELT: It was always a challenging part for Bangladesh to achieve the expected competencies in ELT. About 78% respondent confirms that students are not getting expected level of competencies in online ELT during COVID.

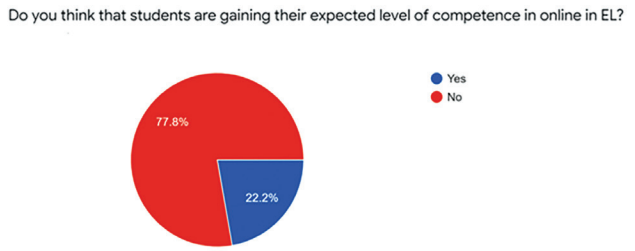

Fig.5: Respondents feedback on competence in Online ELT

e) Opportunities in online: Almost all the respondents agreed that online creates a new window of ELT & learning. A good number of findings were shared by the respondents as the online opportunities of ELT in which about 89% agreed on allowing scopes of using online tools.

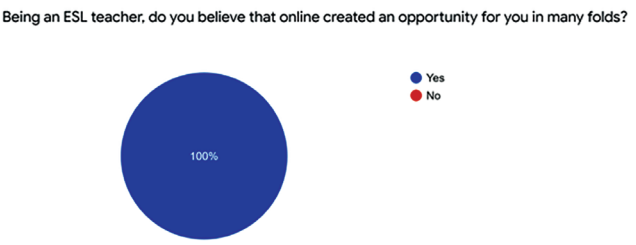

Fig.6: Respondents feedback on online opportunities

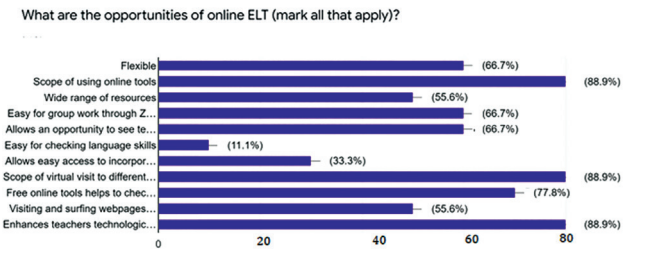

Fig.7: Respondents feedback on online opportunities for ELT

f) "In Do you think that COVID affects students & teachers mental wellbeing?" in response to this question about 91% agreed on it with 5% neutral comments.

h) Post COVID ELT:It was a surprising as well as demanding feedback from the respondent that about 67% are thinking for Hybrid or blended version of ELT in post COVID era. But most of the rural students and teachers gave their opinion on Face to face instruction because of their crisis on having the digital devices, technological competence and poor internet connectivity.

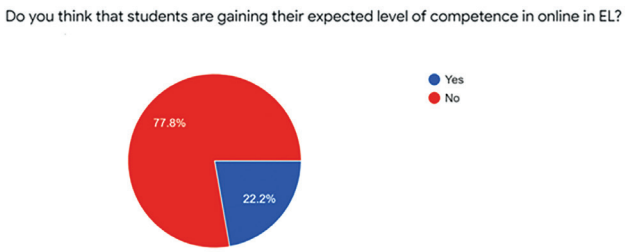

Fig.8: Post COVID ELT choices by the respondents

CONCLUSION

Though online English Language Teaching has some challenges it has brought positive impact in the lives of teachers and students and working professionals. It has given an opportunity to take up additional courses along with their professions and studies. So the importance of English Language Teaching during Covid 19 cannot be denied. During post COVID era, we must include those good things which showed better performance. A mixed method or Hybrid method or blended method of teaching English can reflect the better output at secondary level of Bangladesh.

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Translation of English Aviation Compound Terms into Ukrainian

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Abstract

Rapid development of science and technology deepen the knowledge of existing reality. Thus, there exists a need to develop terminology creating new terms. For translators it means to find the most appropriate way to translate a new term. As many terms in English are formed with compounding, the conducted research was aimed at studying of peculiarities of the translation of English compound terms into Ukrainian, specifically in a field of aviation. It is important for the study to outline a theoretical basis. First of all, it is important to outline the meaning of a term and a compound, than to research the main ways of terms translation.

Keywords:

INTRODUCTION:

The word "term" comes from the Latin word "terminus" meaning border. According to O. S. Akhmanova, a term is "a word or phrase of a special (scientific, technical, etc.) language, which is created, obtained or borrowed for the exact expression of special concepts and designations of special objects" (Akhmanova O.S. ,2004). S. V. Shevchuk interprets the term as "a word to denote the concept of a special field: science, technology or industry. Together with words of general use, they serve a certain field of knowledge" (Klimenko I. V., Shevchuk, S. V., Alerta,K., 2011).

The word "compound" comes from the Latin word "compositus" that means formed of parts (Dubravska D.M., 2012).According to the definition of A. G. Sadykova "compound is a structurally complex multifunctional unit of direct or indirect nomination, a kind of derivative formed by a standard model or by nominating a syntactic phrase" (Sadikova A. G. , 2004). Semantically there are three types of compounds in English. There are Endocentric Compound, Exocentric Compound and Copulative Compound (Altakhaineh A. R. M. 2017).

Endocentric compounds are more common in terms formation. They consist of one main part and one or more dependent parts where semantically the main part is a hyponym for the meaning of the whole compound (Haspelmath M., 2010). For example, in a word airfield the meaning of a main part is narrowed to "a field where airplanes land".

Due to peculiarities of English word formation most of compounds can be terms no matter for parts of speech they were formed of. English compounds can be nouns, adjectives or verbs (Christianto D. , 2020) while in Ukrainian compounds can be only nouns and adjectives. It is important to note that in Ukrainian compounds can be terms only is there are formed of nouns (Plusch M. Ya., 2005).

METHODS TO TRANSLATE A TERM

The main way to translate a term is to find an appropriate equivalent. But if there is no such possibility the following methods can be used:

1. Transcoding is one of the easiest ways to translate a neologism when letters or morphemes of a lexical unit of the input language are transmitted using the alphabet of the target language. Sometimes a mixed method of transcoding is used, when the word is transmitted partly by sound and partly by spelling. Transcoding in technical translation is used when the term consists of international term elements in Greek or Latin. It is appropriate to use it to create an unambiguous term. It is due to transcoding that a single vocabulary of terminology is formed 9 Bilozerska L. P.,N. V. Voznenko, S. V. Radetska, Vinnytsya, Nova kniga , 2010).

2. Structures that are complex in structure can be translated using calque when their constituent parts (morphemes or tokens) are translated separately by the equivalents of the source language. This method is preferred over transcoding due to the fact that when transcoding the word may not make sense in the language of translation. But calque is also used only if the term obtained in this way does not contradict the language norm of the source language. Therefore, during calque in a word, a number of transformations can occur, such as changing the case form, number and order of words in a phrase, affixes, etc. (Bilozerska L. P.,N. V. Voznenko, S. V. Radetska, Vinnytsya, Nova kniga, 2010).

3. The method of descriptive translation replaces a term with a word or phrase that fully reveals its meaning in this context if the dictionary does not provide a direct translation of the term. But it should be noted that in such a translation, the resulting interpretation should not have a complex syntactic structure. Thus, there are several disadvantages: descriptive translation reveals the concept vaguely and violates one of the requirements for the term, namely brevity (Karaban V. I.,Nova kniga,2002).

4. Specification is a lexical-semantic method when a word of a broader meaning, given in the original language, is replaced by a word in the language of translation, which according to the requirements of context or style narrows its meaning (Karaban V. I.,Nova kniga, 2002).

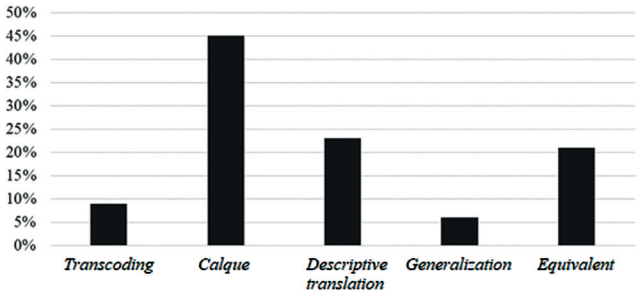
5. Generalization is used in cases where the information presented in the word of the input language has a higher degree of order than the corresponding in the language of translation. in this case, a simple verbal or morpheme translation is not enough to fully understand the original meaning of the text. Therefore, depending on the context, words will be added to the term, which will clarify its meaning in the language of translation (Karaban V. I.,Nova kniga, 2002).

METHODS:

Two dictionaries were chosen for the study: English-Ukrainian Dictionary of Aviation Terms by R. O. Gilchenko published in 2009 and Thematic dictionary of aviation terminology (R.O. Gilchenko, 2009). English, Ukrainian, Russian languages by O. M. Akmaldinova published in 2013 (O. M. Akmaldinova , 2013).

RESULT & DISCUSSIONS:

The results of the study can be seen on the chart.



Calque is used the most; it was used for 45% of terms. Descriptive translation was used for 23% of terms. 21% of terms has equivalents. 9% was translated by transcoding. Specification wasn`t used at all. Generalization was used for 6% of terms. It has to be noted that 9% of terms has more than one variant of translation.

The peculiarities of translation are described below:

Using calque a term can be translated as a compound word, a word with affixes or a phrase. It happens because of the differences of English and Ukrainian compounding. As it was noted, most of the Ukrainian compound terms are adjectives (fireproof – вогнетривкий, single-blade – однолопатевий, widebody – широкофюзеляжний) and nouns formed of nouns (bombshelter – бомбосховище,

radiodetermination–радіовизначення, aerostation –повітроплавання). The terms with affixes are mostly formed when a term in English contains a preposition that are not considered full words in Ukrainian (bombed-out–розбомблений, burnout – прогорання, перегорання, overheat – перегрів). The base free translates into Ukrainian as a prefix без (accident-free – безаварійний, airfree – безповітряний), and ability transforms into suffix –ість (controllability – керованість, контрольованість, flammability – займистість). Mostly The compound terms are mostly transformed into phrases formed of a noun and a dependent adjective (airhole – повітряна яма, backflow – зворотний потік, radar-equipped – обладнаний радаром).

CONCLUSION

The descriptive method is used when it is impossible to fully convey the meaning of the term, embedded in it with the help of the peculiarities of the word formation of the English language, due to certain limitations of the Ukrainian word formation and lexical content of the language. Thus, there is a need for additional explanation of the meaning through its description. For example there is no such concept as jetlag in Ukrainian so the meaning has to be described (порушення біоритмів унаслідок перельоту через кілька часових поясів). Most of the equivalents used in the dictionaries are borrowed from other languages, for example шасі, ангар, дирижабль, каркас borrowed from French. This happened because Ukrainian aviation did not have the conditions for independent development, and, as a consequence, the formation of its own unique terminology. The transcoding method is mostly used when the components of the composite are derived from Latin or Greek (accelerometer – акселерометр, aerotechnics – авіатехніка, airplane – аероплан).

The need to use generalization is due to differences in English word formation and substantivization, as well as features of the lexical structure of words. For example, in the original English text, the term troop-carrier includes the term airplane, but when translated into Ukrainian, it needs further clarification because the morpheme translation does not reflect this meaning and will be translated as транспортно-десантний літак. Specification is used when a meaning of a word has to be narrowed down in a translation. However, the compounding itself narrows the meaning of a term so it was not used at all. The conducted research can be used by beginner translators to study translation methods and their use.

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Creative Online Didactics for Physics Practical Classes at Higher Secondary Level During Pandemics : A Case Study in English Medium School of Bangladesh

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Abstract

Due to the ongoing pandemic, teaching has changed to be an audiovisual-only stimulus. Teaching science is very linked to experiment based which is absent now a days due to ongoing pandemic. Lectures are in video formats or as PowerPoint slides and this causing issues with little learning competency among the students. So lecture materials must have some entertainment as well along with the instruction aspects. Incorporating science experiments from Youtube channels for teaching and education and simulations can make science learning more engaging. This paper focuses the creative online didactics for Physics practical at higher secondary lasses with commendable results. This study involved 307 students & teachers over the two semesters and the reviews have been mostly positive with 56% approval rating and 44% having concerns and suggestions for further improvements.

Keywords: online teaching, physics practicals, audiovisual teaching materials.

INTRODUCTION

Science education at its core is based on observing real life and the ways of nature and developing theories and working further on them (Robin Millar, 2004) . We have to identify the underlying patterns and develop mathematical relationships to establish them concretely for further research and investigation. Identifying the intermediary factors, determining uncertainties and sources of error are the prime objectives of science practical lessons (Kipnis, Nahum. 2011) . As always, we have to train the next generation of young scientists and research technicians for the next set of requirements and anomalies in the current values that may be evaluated using the next generation of instruments and measurement technology and automation. These are the objectives of science learning and teaching for the new age.

Over the last two decades, due to the advent of global learning platforms and teaching to a global audience, online teaching was being experimented with in different forms such a prerecorded classes, using prepared lessons such as YouTube and Khan Academy and others as others such as EdX, Coursera MIT Open Courseware, etc. (Kukade, Ajay B., 2020) There were two-sided opinions with both learners and teachers that resulted in slow progress and even slower integration of the processes and the technology for adoption into regular use. Everyone had their reason why it was still not perfect but

no one had full solutions either. Since March 2020 when institutions had to shut down for the covid 19 pandemic, this has suddenly become the only means of imparting lessons for billions of teachers and students globally (Dhawan S., 2020; UNESCO,2020).

Practical classes are sessions where the students get to experience the tools of their trade and learn their use, get to learn the reality aspects of apparatus and the risks of using the techniques, maybe even what could be sources of errors in taking values and even what could be fatal(Sshana, Z.J., & Abulibdeh, E.S. , 2020; Tolosa Geleta, 2015). If done in the truest forms, practical classes can be the most interesting part of the course and if the facilities are lacking or irregularities have already set in, can be the most tormenting psychologically and a true handicap at the end of the course and for exams.

In the context of the covid 19 pandemic, teaching and learning practical physics has been a formidable challenge for institutions and teachers since no materials and techniques were in place to substitute hands-on activities. Students and teachers capitalized on the experience and made the best use of available resources. Institutions without proper facilities were without help and the students were at a loss at the end of the course. The pandemic initially made the situation more challenging by having everyone 'flying blind' and sent practical teachers scurrying for online resources (Punit Renjen, 2020).

In the context of emergencies and the impending exams, all available online resources were sought out especially Youtube channels and simulations. These were used for online classes. It was then observed after a few weeks that students and teachers were suffering from screen time fatigue and eye strain and were not following the lectures anymore. Also, there were cases of internet connectivity issues and disheartened students left the sessions.

From recent studies by Jarosievitz, Beata(2014); NoorShah(2002); Legaria, M(2020); options for delivering physics and science classes online were being developed in the early 2000s till now to remote students and especially practicals physics lessons where there were no good lab facilities or institutions were lacking teachers or lab facilities. Firstly, It had to be decided what were the most critical parts of the course that must be covered. Then there were the parts that needed to be introduced to remove the monotony and if there were anything extra that I could add of value using the online teaching as an opportunity in a challenge. The only means available were using powerpoints, prepared video lectures, youtube videos, and further visual schematics to clarify topics.

Compared to the previous research papers, the restriction upon the teacher, the transmission system, the students and their levels of interests, their psychological condition, and their alertness at the time of the lectures under the pandemic conditions are not seen or heard of earlier. Even the data collection system has its restrictions of the students not being directly accessible by the teacher but had to be accomplished through personal contacts with a few students and them acting as a medium to collect the data.

This study began for a quality video searching for a worthy of presentation that took several days. Followed by categorizing the videos and tutorials under the appropriate topics. Presenting the topics from three different perspectives was vital since the only stimulus was visual. There are resources on youtube, khan academy, MIT open courseware, and also simulation. One technique was found to be very helpful through presenting advanced and engineering applications of classroom topics that may be otherwise mundane. e.g. Friction lectures involving two wooden blocks get interesting with friction welding and NASA and aircraft applications. Also, fine-tuning the lectures from the second term has introduced problem-solving, numerical requirements, and assignments. Simulations and model experiments are also valuable assets available on the internet.

METHOD

Experimental quantitative as well as qualitative research design has been used under this study. To determine the feedback from the students on the issue, and to identify their thoughts on it this study uses survey method. Science teachers and students of A level from a reputed English medium school have been considered as our target population. The respondents were selected through purposive sampling and a total of 307 respondents participated in the study .

PARTICIPANTS AND DESIGN

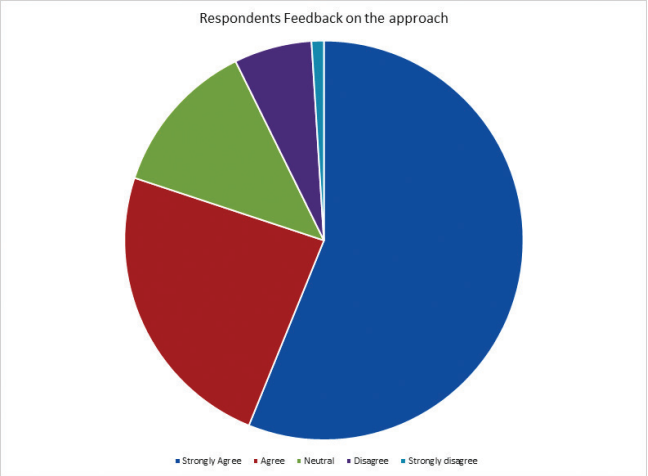
In order to conduct this study, participants were recruited among the science students taking physics course and science teachers instructing Physics at English medium school in Dhaka, Bangladesh. Upon agreement to participate, participants were asked to fill out a questionnaire. The study was conducted among 297 students in an English Medium school offering A level Physics course out of 600 students with random sampling. 10 Physics teachers were also engaged to take part in the survey to share their valuable thoughts.

RESULTS

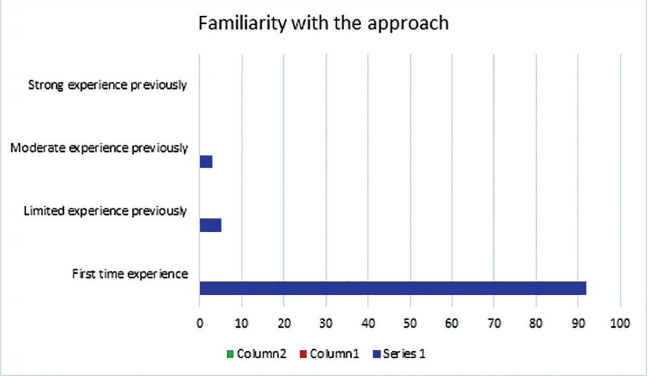
Based on the structured questionnaire and interview of the respondents, this study came up with the following qualitative statements-

- "honestly speaking, online practical classes are not as effective as in-person classes."
- "The main reason for our motivation to do lab classes was that we wanted to try the experiments by ourselves, which is not possible in online classes. "
- "Hence, we lacked enthusiasm in online lab classes. Most of my friends keep a screen recording of the online classes and then watch them weeks before the exam."
- We find interesting & deep learning through simulation, you tube videos and online portals to study Physics practical lesson
- Strength: More time to organize classes since more time is available for research and study. Material for classes is more readily available than even a few years ago since many online institutions and teachers are trying their best to help students and teachers to keep working. However, some of the improved materials are also available for a free which may be unpayable due to the economic situations prevailing. Significant time saved in traveling in Dhaka traffic.
- Weaknesses: Eye strain is a common issue and exhaustion from excessive screen time. Students are experiencing stress from lack of exercise, stress from the monotony and uncertainty of their plans, and financial issues faced by their parents. Some students are dropping off and but there is no means of feedback.

The concept of incorporating online tools with offline, which we may call as blended or hybrid learning is a new phenomena in our country. In our study it shows that about 70% participants strongly agreed that this strategy will bring more fruitful result in teaching physics practical online.



Majority of the participants under this study agreed that this was their very first time experience of learning physics practical under this hybrid/ blended approach which showed more engaging and interesting.



Majority of the responding teachers (almost 94%) agreed that they have received better performance with this approach. Although the internet bandwidth and poor signal at some part of the city affected the real outcome but overall the study finds a new pathway to teach science practical classes in a hybrid mode.

CONCLUSIONS

Experiments are the key part of science teaching and learning. During the face to face mode of teaching, the teacher has the scope to teach with

hands on experiments where student can see the real scenario of a particular issue of his/her lesson but its so difficult to do that in online. The approach taken in this study and also its findings are giving us hope and shows a new pathway of teaching and learning science which can not only be used to teach in English medium schools but also in National curriculum focused educational institutes. Recommendations from the research would include continuous updating and finetuning of the available resources and staying calm and alert during the class duration or any contingency that may arise.

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Math Phobia and Its Remedies: A Case Study of Secondary School Students of Nepal

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Abstract

Recognized the hardest subject in the world is Mathematics. Finding the reasons and remedies for Math phobia is the main objective of the journal. An experimental methodology integrating both qualitative & quantitative data were applied with a sample size of 298 respondents including 190 students, 80 parents & 28 teachers at the high school level of country Nepal. The catchment of the survey effect around 1500 people through random sampling. And a summary is that mathematics can easily be taught in a very funny way using a variety of stocks in which the students get direct involvement through varieties of games and other interactive ways.

Keywords: Phobia, remedies, left-brain, right-brain, superstation.

INTRODUCTION:

The word Mathematics (/maθ∂matIks/) comes from the Greek word 'mathema' which means science, knowledge, or learning and it is sometimes shortened to maths (in England, Ireland, New Zealand, and Australia) or math (in the united states and Canada) (Wikipedia, 2021) . The short words are often used for arithmetic, algebra, and geometry by students in their schools. Mathematics includes the study of number, structure, place and change (Kemeny John G.,1959) . Things can be counted by number and this subfield is usually called arithmetic. Things are organized by structure and this subfield is usually called algebra. Place is for things and their arrangement and this subfield is usually called geometry. Things become different by change and this subfield is usually called analysis.

Mathematics has two parts, pure math and applied math. Pure Math is the study of basic concepts and structures that underlie mathematics (Penelope Maddy, 2008). Its purpose is to search for a deeper understanding and an expanded knowledge of Mathematics itself. It includes algebra, geometry, number theory, analysis, arithmetic, statistics, calculus, mathematical physics, probability, set & logic, function, topology and differential equation. Applied Math is the application of mathematical methods by different fields such as science, engineering, business, computer science, and industry. Thus, applied mathematics is a combination of mathematical science and specialized knowledge (Patil S. P., 2018) . At the high school level, we use pure math more than applied math.

Math is incredibly important in our lives and without realizing it, we use mathematical concepts as well as the skills we learn from solving mathematical problems every day (Cresswell C, Speelman CP, 2020). The laws of mathematics govern everything around us and without a good understanding of them, one can't encounter significant problems in life. These are a few reasons that math is a powerful and incredibly useful tool. a) Math is used in

practically every career in some way. b) Math is all around us and helps us understand the world better. c) Learning math is good for broadening our minds. d) Math helps us with our finances. e) Math helps us tell time. f) Math makes us better bakers. g) Math helps us have better problem-solving skills. h) Math can help us shop for a good sale. i) Math can make us more popular. j) Math is the universal language.

Mathematics has come out on top of the difficulty chart. Mathematics is a subject that sometimes requires students to devote lots and lots of time and energy (Stephen S. Willoughby, 1990). For some students, math is not something that comes intuitively or automatically with plenty of effort. This means, for many, the problem has little to do with brainpower; it is mostly a matter of staying power. Since students don't make their own timelines when it comes to 'getting it', they can run out of time as the teacher moves on to the next topic.

According to some brain science scholars, logical, 'left-brain thinkers' lend to understanding things in sequential bits, while artistic, intuitive, 'right-brain thinkers' are more global (Hurwitz, Donald M. , 2001). They take in a lot of information at one time and let it 'sink in'. so left-brain dominant students may grasp concepts quickly while right-brain dominant students don't. To the right brain dominant student, that time-lapse can make them feel confused and behind. But in busy classrooms with too many students, extra time just isn't going to happen.

Math know-how is cumulative, which means it works much like a stack of building blocks (Meredith Cicerchia , 2021) . Our first mathematical building blocks have been established in primary school where we learn rules for addition, subtraction, multiplication, and division, and those first concepts compare our foundation. The next building block is in middle school when students first learn about formulas and operations. The big problem starts to appear sometime between middle school and higher secondary school because students very often move on to a new grade or new subject before they are really ready. A student who scores grade 'C' in middle school has perceived and understood about half of what they should, but they move on anyway. They move on or are moved on because a) they think grade 'C' is good enough. b) Parents don't realize that moving on without a full understanding possesses a big problem for higher secondary schools and college. c) Teachers don't have time and energy enough to ensure that every single student understands every single concept.

It is found that there is no remarkable variation between the recent studies and current theoretical aspects of the focused study. People, parents, students, and even teachers except for Mathematics and Science also have a Math phobia and they still feel mathematics is a very hard subject (Szczygieł, M., 2020, Mahapatra P.K. , 2020). The survey and discussion indicate they need Mathematics, without Mathematics they can't move their daily life in this 21st century and internet base society but they have superstition and fair of Mathematics. Due to the grading system of evaluation and online classes due to the pandemic situation of "Corona virus 2019" students fell more difficult in Mathematics and their concept about Mathematics is increasing day by day negative and negative in Nepal.

METHOD

The study utilized the experimental quantitative as well as qualitative research design. Specifically, survey method was employed to determine their feedback on the issue, and to identify their thoughts on it. The population of this study was the teachers, students and parents of secondary level of Nepal. The respondents were selected through purposive sampling and a total of 298 respondents participated in the study .

The hypothesis of this study was :

H 1: Math is difficult

H2: Proper mentoring and approach can eradicate the Math phobia among the students of secondary level

2.1. Participants and design

Participants were recruited among the students and non mathematics teachers at secondary level of Nepal. The measurements consisted of questionnaires, which were handed out upon recruitment. Upon agreement to participate, participants were asked to fill out a questionnaire. The purpose of the interview was to know the status of the difficulties about Mathematics at secondary level and also get to know their feedback on this issue if they were given proper mentoring and approach.

The study was conducted among 190 students in a secondary school of 5 to 12 grade out of 750 students with random sampling. 80 parents out of 482 parents who are directly related with children's education and 28 teachers who do not teach Math and science subject. A pre-survey questionnaire related to this research was conducted to see views about thinking, approaches, view, vision, important, use, implementation of mathematics in the participant's view. After that we provide Mathematician's view about the origin of mathematics, left-brain thinker's and right brain thinkers, reasons and solutions of math being difficult.

RESULTS

On the survey taken from 298 students, parents and teachers, it was seen that a dramatic change in the concept on Mathematics when they were given a brief exposure to the fact of Mathematics. The survey clearly traced out the positive impact after the information was delivered. This difference in the perspective before and after the survey is elaborated in the form of chart below.

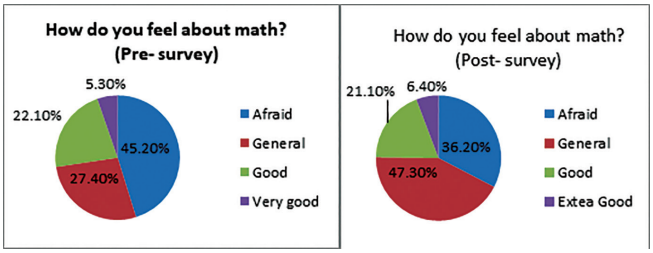

Figure 1: Pre & post survey view of the respondents

The output of this work reflects that a high percentage of the respondents were afraid about Mathematics before this intervention but the exposure of the Mathematical concept with proper guideline reduces that afraid level. During pre survey 35% respondent agreed that math is difficult but after the proper idea sharing it reduces to 27%.

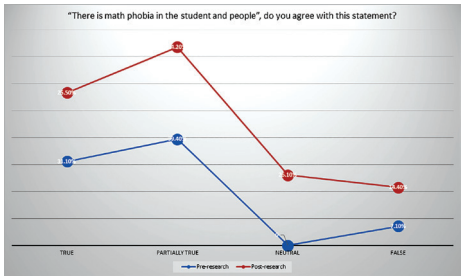

Figure 2: Perception on Math Phobia during pre & post survey

About 31% agreed that there is a Math phobia among the students and people during the pre-survey but the effect of knowledge sharing reduces the level into about 25.5%.

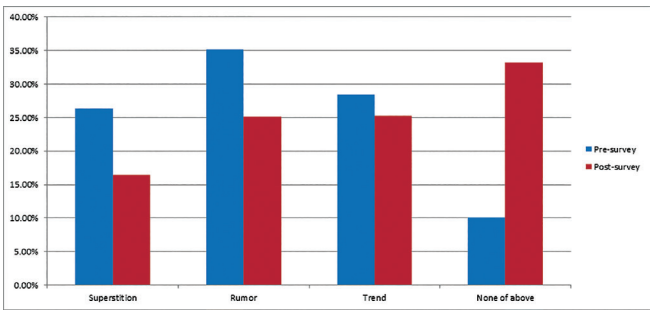

Figure 3: Pre & post survey view point on some issues on Math

The study shows that proper intervention on the Mathematics reduces the superstition, rumor, trend. It also indicate that after the intervention the level of people on disagree to Math phobia increased where most of the respondents were strongly agreed with the Math phobia in pre-survey.

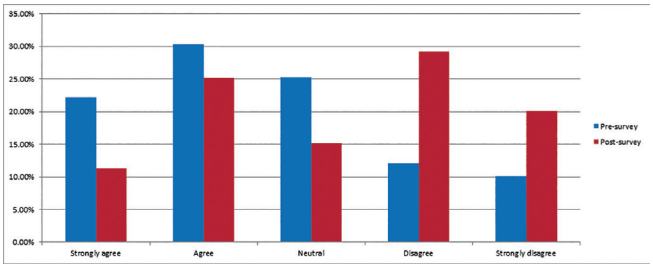

Figure 4: Respondents perception during pre & post survey on Math Phobia

CONCLUSION

Mathematics is actually not a difficult subject at all. However, the common perceptions of the society and the people has really brought a different thought such that the whole society and even the students themselves are imposed by the thought that it is very difficult subject. Mathematics, if taught differently in a way that such that there is maximized involvement of pupils through varieties of games that may be indoor or outdoor games as a relevant, the core interest towards learning mathematics in the students can be dramatically increased. This has even been verified by post survey during the research. Thus, eliminating the misconception that

mathematics is a difficult subject to learn can also be wiped out. Hence connecting mathematics two day to day activities would definitely increase the level of core concern of the students towards this subject.

The following practices can be accommodated to help our students feel make math easy and interesting.

1. Talk to the child: Find out why they feel how they feel about mathematics. Talk to them about their worries the learning of surrounding. Surrounding math learn. Go through their worries one by one to see what you can do to help.

2. Teach them to take notes: Encourage students to take notes in class due to copy down any necessary formulas or tips that their teacher shares. They can use these to study before an exam or while completing homework. Even when they don't have a test or homework, encourage them to review their notes daily.

3. Encourage them to take their time: Many mistakes are made on math problems when students are frustrated or trying to rush. So when they are in stress, teach them how to breathe deeply. This will help to calm them down they feel overwhelmed. Talk to them about the importance of pacing themselves.

4. Teach them at their own pace: If you teach children a child, do not move on to the next lesson until they have successfully grasped the first. Remember that children develop math skills at different ages and some children may be more language oriented than math oriented. Let them know that it's okay to have other strengths and have them focus on finding a learning method that works best for them.

5. Provide them the tools that are needed to be successful: Students can learn from chalk duster on a black board and marker on a white board by the traditional system or rote learning system. They might need visual aids, online tutorials classes, online videos and so on from which they are able to learn with different methods and techniques of different teachers.

6. Value their mistakes: If you are their teacher, don't say 'wrong' when they provide an incorrect response to a problem. Focus on the problem solving process rather than final answers. When the students get an incorrect answer, help them go through the problem solving process to find the mistakes. When they find it, reward them.

7. Take breaks when necessary: It is good to take break so that the student's do not become agitated with math. If you sense that they become overwhelmed, give them short break, like bathroom break for 3/4 minutes away from the subject to rest their minds, water break for 2/3 minutes, snack break for 5/6 minutes, yoga break for 1/2 minutes by closing their eyes, jokes break, story break and so on.

8. Take the emphasis of tests and timed assignments: Test is very important in today's school systems. The ultimate objective should be to train students who are confident and capable for doing math. Provide additional time to students for completing class assignments. If you are parents, don't force them to complete their homework. Do not make that time any more stressful for them.

9. Tutor them or hire a tutor: The children might be struggling to grasp the concepts in the classroom and they might be able to perform well with the outside help. If you are their parents, you can also work with them individually after and before school.

10. Speak positively about math: Teachers should have to talk to the students about how beautiful math is. Watch movies or read books that feature famous mathematicians. Teach them that math can be fun and it will help them feel less anxiety about it.

11. Provide incentives when they do well: If children show progress or hard work, reward them by giving small prize or chocolate they want. Don't promise things in advance to them. This might make them feel even more pressure to achieve.

12. Make math fun: The teacher in corporate to tell jokes, to play games, to sing songs, to watch cartoon or animals characters in the class. Use different colors maker pens, copies, pen, pencil, intuse pad etc. Find fun computer maths games or apps they can download in their mobile or laptop

13. Learn from your mistakes: Learning from the mistakes is good thing. It means that if you are making any mistake then you should note it. Try not to do it again in any cost, you should give time to solve your mistakes and you should learn from your mistake so that it can be rectified.

14. Ask your doubts to the mentors: If students do not understand any topics or questions they have to prefer consulting their mentor to make it clear and they should not hesitate asking their mentors.

15. Prefer the relevant study materials: There are various study materials like books, internet, e-book, open learning class, NCED math video, CDC math video, DOIT math video, midas e-class and so on YouTube, radio and television channels around you. Choose the right essential learning materials and study. If you choose the irrelevant material, you have to face in more confusion. So prefer the correct study material and clear your doubt.

17. Be confidence about yourself: Students should have confidence and always have a single slogan that 'I can do it', and never give up.

18. Use the following Tips: Here, we have some few useful tips for solving mathematics problem:

a. Practice, practice and more practice. It is impossible to study math properly by just reading and listening.

b. Apply math to real world problems.

c. Create a mathematical dictionary.

d. Review errors.

e. Master the key concepts.

f. Understand your doubts.

g. Create distraction free study environment.

h. Use the latest technology in the education i.e. ICT class.

19. Follow some steps: These few steps also help you to get rid of math phobia:

Step 1 : Do some breathing exercise daily before you start the day. This will help to calm your mind.

Step 2: Work your math skill daily and try to understand the subject.

Step 3: Apply your knowledge of math in daily life.

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Digital Learning : Instructional Practice

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Abstract

Digital learning is an instructional practice. It somehow helps the learners. It makes use of a wide range of technology enhanced educational strategies. It includes blended learning flipped learning personalized learning and other strategies it really on digital 22 a small or large scale. COVID-19 enables us to see the strength and importance of it. Like many countries around the globe, Bangladesh can accelerate its educational as well as sustainable growth by incorporating or prioritizing digital learning.

Keywords: Digital Learning, Blended Learning, Technology.

INTRODUCTION

The present world is trying to increase digital learning to communicate and pass/share knowledge and information to both the learners and the facilitators. Digital learning is a wide variety of electronic processes that enable access to education (Pallof, 2007). This include-Virtual classrooms, Digital presentations, computers, Tab, Smartphone-based learning, Digital collaboration, Video, and audio recordings, Interactive class through Google meet, zoom, and so on. In fact, the digital army knife our lives evil and distance learning ways. Digital learning can also be provided face-to-face instruction. Which is called blended learning (Bonk, 2005, Dziuban, 2011) .

Digital learning has versatile effects on learners (Akyol, 2011). It can help the learners to improve their knowledges. It makes really easier of the learners works. Because the learners may have an advance and more information by easily searching their lesson related sites. with this digital technology it gives more information to the learners to gain more knowledge about their class works (Bates, A. W. & Poole, G, 2003) . There are so many technologies that were integrated into the classroom (Roblyer, M.D., 2006). It helps the learners learn with comfort. It also helps the learners to gain and recall more information by using digital devices. It will help the learners to be more active and gas in their lesson (Conceição, S. C. O., & Lehman, R. M, 2011).

BACKGROUND/ HISTORY

The 21st century has opened about a great change in the education by the grace of internet. Though there are many examples of the uses of machine and tools in the history of education. Digital learning is the new concept of the modern world. In1950s slide projections and television best classes have been taken. In 1960 the university of Ilion had started online learning in the world firstly. In 1984 the university Toronto was offered in the first ever completely online courses. The university of phoenix was the first educational institution in the world to launch a Wholly online collegiate institution offering both bachelor's and master's degrees. Online learning is booming in present times based on the availability of high-speed internet (Picciano, A., Dziuban, C., & Graham, C.,2014).

TYPES OF DIGITAL LEARNING:

Digital learning is the system in which it is shared

from the facilitator to the learners (Duffy, T. M. & Kirkley, J. (2004). When the learners can be able to view the course material without any obstacle is called informal distribution form of digital learning. On the other hand, formal distribution form of digital learning facilitators usually keep track and make recordings of learner's progress and result. Maximum educational institution offer certificate for learners have suggestive systems and standards for giving the scores.

To ensure students standards for each course should be maintained by tracking scores. This is the platform where users are enabled to create good online course and they are easy able to access these courses. It may be payable or without payable. By creating an online course, there are a number of varieties to be met. Firstly, setting a list of criterions ensure that students benefit fulfil from the courses they signed up for.

ELEMENTS OF DIGITAL LEARNING ARE

Digital learning integrates a variety of components to make the process smooth and effective which includes-

Facilitator: The role play of facilitator is vital. Necessary feedback should be offered to the learners and also responsible for keeping learners' progress.

LMS (Learning Management System): Learning management system should be well organized it should be easily navigable for both the learners and facilitators. The key features of learning materials are formatted in easy and simple so that learners can be able to easily access.

Communication: Communication is another important part of digital learning course work. Facilitators and learners can use various mode to exchange or share their knowledge. Here they may use multimedia device, Google meet, zoom, tab for interact to each- other.

ADVANTAGES OF DIGITAL LEARNING:

The whole world is trying to welcome the information and technological revolution. Nowadays many institutions are offering higher education through digital learning courses. Through digital learning, institution can accommodate as many learners as they wish. Here accommodation space and classroom space are no longer limiting factors (Means, B., Toyama, Y., Murphy, R., & Baki, M., 2013).

Digital learning covers many advantages which are-

- Flexibility: Digital learning is very flexible as learners can access materials at any time any place as their sweet will.
- Cost -effectiveness: Digital learning provides the need for learners and facilitators to be located in a central place for learning to take place. This saves money that could be spent on transport, accommodation and other uses.
- Best participation and individual instruction: Learners are free to interact with online tutors. This helps learners to understand concepts. The facilitator can offer full attention for a large time to a single learner online which is quite difficult in a conventional classroom.
- Flexible timetables: in digital learning the learners have the flexible of passing halfway through the tutorial and resume at a letter time or date which is totally absent in school-based learning system.
- Scope of learning & practicing technology
- Allows wide range of use of educational tools
- Allows a student to join the program even from a remote area
- Enormous resource availability at web
- Enables to join many programs which are difficult to join physically due to time constrain, job leave, cultural barriers and many more
- Good for professional development

CHALLENGES OF DIGITAL LEARNING

Due to covid-19 digital learning has expanded exponentially in the last year. Although digital learning allows many scope and advantages but it faces some challenges as well. Some limitations or challenges of digital learning are-

- Digital devices: To get access to digital learning the participant must have to have any kind of digital devices like laptop, desktop computer, mobile phone, I pad, tab etc. People facing economic crisis is not getting proper access to digital learning because of no device issue or short or little access to it.
- Internet connectivity: Many countries are facing poor internet bandwidth to allow a smooth connection to the digital learners. Thus, connectivity loss or difficulties in getting

connection is a very common phenomena in the world of digital learning in the developed countries during COVID.

- Absence of human connection: Digital learning helps its learners to reach the learning goal but the aesthetic value of teaching and learning is absent here.
- Lack of opportunities of collaborating learning
- Decline of Hands-on- learning
- Assessment process faces difficulties
- Learners must be technologically sound
- Needs proper training to adjust in this field
- Absence of socialism and empathy

DIGITAL LEARNING : PERSPECTIVE BANGLADESH

During the pandemic situation covid-19, digital learning has gained parity in the education sector. Media like zoom, Google meet has gained massive popularity during this quarantine days. Facebook messenger and YouTube channels are also incorporate here. These are using not only teaching or educational purpose but also business or official functions. In the scenario of Bangladesh there is a great limitation about evaluations or tests. There is no public or private university in Bangladesh who has established a dedicated software for using teaching learning and evaluation. Only the ministry of education has taken a limited steps with limited sources. However, for the future we should think about revolutionary change in learning perspectives. At least for the tertiary levels the government should think about creating a dedicated software that is used only for educational purpose. This software will work as a hub.

CONCLUSION

Digital learning is a buzzing sound in the present world. Digital learning was increasing slowly. But covid-19 situation has brought to the Limelight in the whole world. Every country is trying to adapt the digital learning to continue their learning process. Workshop, webinar, seminar is being arranged worldwide to find out the advantages and limitations. Lots of suggestion are given by the renowned educators. They are also trying to overcome the limitations. Every country in the world is trying to adapt the digital learning as soon as possible. Because there is no alternative to adapt it. So, we should positively come forward to apply digital learning not only pandemic situation but also the normal situation. Blended learning can be the real education scenario in new era (Garrison, D. R., & Vaughan, N. D. , 2008).

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PART B

The Stories from ACCESS Communities

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Student-Centered Language Instruction

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Language teaching is a great privilege. Compelled by a variety of motivations and goals, students step into the classroom making a conscious choice to study a language. Helping them to find success as they meet these goals can be deeply fulfilling for the teacher. These students already are or will be, leaders in their families, businesses, and community, and thus teachers support a lifetime of students' successful contribution to society. The basic role of the language teacher is to facilitate the development of students' second language acquisition and communication skills. Just as important, however, is facilitating the development of student confidence, attitude toward learning, and sense of self-identity as a world citizen. Language classrooms should be a learning laboratory for each of these strands of development.

A distinctly student-centered language classroom emphasizes the role of the student in the learning environment as an active participant. Students are given a voice to impact culture, curriculum, and assessment, and teachers shift from the role of "directors" to "facilitators." Students are continuously encouraged to take ownership of their learning, engaging in critical thinking, recognition of purpose, leadership, choice, and process growth. Student-centered learning is a popular teaching strategy with great merit, but especially critical to apply to the concept of language learning, which is a lifelong process. A successful language teacher will give students the tools necessary to continue learning far beyond what happens inside the classroom.

The first step toward student-centered language instruction is to consider the learners. An instructor of any discipline must not only understand the content but to whom the instruction is directed. It is important to begin by surveying learner attitude, necessity, and expectations on an individual and group level. Such information is invaluable in developing a classroom culture that seeks both to meet the language acquisition needs and to promote a healthy attitude toward the target language. The classroom is for the student, not the teacher. Classes should be organized and planned to further the stated goals of the students over the teacher, thus allowing the potentiality for different learners to dramatically alter the course material and/or delivery.

A language teacher's responsibilities are to impart knowledge, encourage inquiry, facilitate growth, and promote self-confidence. Most clearly, the job of a language teacher is to instruct students in the understanding and use of the language (hereinafter focused on English language learning). To do so, a teacher must know the students, plan and deliver lessons for them specifically, evaluate the effectiveness of teaching and skill acquisition, and wisely respond or react accordingly. Additionally, a language teacher must create a classroom environment that encourages an attitude toward learning characterized by personal inquiry and responsibility. Together, these two characterizations will promote language learning and growth among students, a growth which is further multiplied by creating a comfortable environment in which to learn. Finally, true learning parallels a growing sense of self-confidence with the material. When learning a language, one of the most detrimental attitudes is an overwhelming fear of error, which

further inhibits learning. Teachers should be advancing students' self-belief in their own ability to communicate fluently in English.

Students also have responsibilities and rights within the language classroom. Because learning a second language is, most often, a personal choice, students should exercise a measure of self-accountability over their own learning. Students should attend class regularly and on time, or, if necessary, consult with the teacher before a planned absence. Students should come to class ready to learn by completing homework, studying lessons, and with all needed materials such as books, paper, and writing utensils. Students should be prepared to follow the school rules and regulations. Above all, students should demonstrate respect toward the teacher, fellow students, and property of others. Students have the right to be treated respectfully by other students and teachers and given every opportunity to learn. While it is important to emphasize personal responsibility on behalf of the student, a teacher's classroom management and organization contribute to a culture that can greatly influence student agency and initiative.

Healthy, open communication between teacher and student is a hallmark of effective student-centered instruction. On the first day of class, teachers should welcome student engagement, model open communication, set a standard of a positive attitude toward learning, and provide clear expectations for the course. This culture can be supported throughout the course by regularly asking students to journal their reactions to the class, the teaching, the material being covered, the assignments, and including a self-assessment of their progress. Such an exercise provides a safe forum to express concerns, offer feedback, and keep student needs as the classroom core. Students should be encouraged to ask a lot of questions while also being given sufficient time to think, formulate the question in English, and ask without feeling embarrassed. A teacher's visibility impacts students' expectations of the teacher's availability and willingness to help. Practicing appropriate eye contact and body language shows active listening with empathy, encouraging students that the teacher is truly listening and valuing the students' contributions. Additionally, a teacher can model personal responsibility with "I" language and choosing positive words. The practice of open communication in the classroom not only enhances the classroom and learning culture but also serves to assure the student that the school is a family of learners committed to his or her excellence.

In moving toward a learning culture of collaboration, the layout and organization of the classroom space may also be altered to allow for maximum student interaction. For example, tables provide more space for materials or cooperative learning activities than individual desks in straight rows. Organizing tables into a U-shape gives all students equal access to the board and to the teacher's assistance. Posting a daily schedule helps students anticipate the class time and promotes responsibility. Sometimes, the class can even move outside of the physical classroom to observe, experience, and practice learning in an authentic environment.

Establishing teachers as facilitators of learning and students as responsible co-directors of their learning leads to collaborative instructional methods and assessment. Learning objectives are the primary driver of the class; not only teachers but even students should be able to articulate the learning objective before, throughout, and after the learning process. The result is meaningful, applicable long-term understanding with increased motivation for independent, lifelong learning.

The goal of English language instruction is to develop students' communicative abilities in English. Language acquisition does not necessarily mean native-like proficiency, but the ability to understand and be understood. Therefore, each and every lesson should be clearly designed to meet a specific communicative need. The lesson should be focused on relevancy: what is the value of this lesson and how will students benefit from learning this content? When students grasp relevance for themselves, their interest and participation is greater. Lessons should begin by making a direct connection to a real-life situation in which the target knowledge is needed. Not only will the current lesson be more effective, but this method of instruction provides the students some sense of practical usage in which to anchor and retain new information.

Traditional language learning classrooms have often focused on lectures and memorization, but student-

centered language learning uses authentic materials and activities that reflect specific content areas. Content areas should be chosen based on student interests and goals. Within those content areas, authentic use of the language can be expressed through case studies, team-based activities, project-based learning, active thinking and reflection, debates, games, and digital tools. Teachers should explore how language is meaningfully used within a defined content area and creatively draw that into the classroom, letting student interest steer. Incorporating the concept of choice, student-centered learning gives room for students to engage with the material through a variety of means, activities, and approaches to meet each student's distinct learning style or modality. Bloom's Revised Taxonomy is a useful tool to incorporate higher levels of learning. Additionally, integration should be valued throughout the entirety of instruction and practice. Reflecting natural language use, the four disciplines of reading, writing, speaking, and listening should be a part of each lesson and level.

It is important that the classroom is interactive and engaging, promoting dialogue between students and teachers, and inviting or, sometimes pushing, students to actively participate in their own learning. The level of instructor excitement can have a great deal of influence over the students' own excitement and love of learning. Offering choices to students further promotes student responsibility. When students know that their participation in the classroom is imperative to learning, it lowers the students' inhibitions, promotes a healthy attitude toward learning, and increases motivation. By respecting students' opinions and life experiences and seeking to promote self-confidence through interactions with them, a teacher can strongly impact the student's desire for lifelong language learning.

In order to accomplish these methods and goals for instruction, teachers must be regularly evaluating both the students' level of production and confidence in the target knowledge. Previously addressed student-centered learning concepts also apply to assessment; in many ways, a shift to student-centered assessment can be more challenging to adopt. To begin, in the early stages of language learning, there is a common stage known as the silent period. The silent period should be recognized and valued as a significant step in second language acquisition, and therefore can be maximized through reading, listening, and writing response activities that build on a growing understanding of the language. Oral production is not to be dismissed altogether in this stage but is not held to be the supreme standard of evaluation.

As oral production increases, error correction is a key component of facilitating and evaluating language acquisition, by offering a form of analysis of student progression and feedback for further instruction. Error correction should start from the beginning so as to avoid fossilization, but should not be overdone in a way that inhibits student motivation. An effective way to do this is to bring the error to attention, but involve students in the identification and correction of that error. The goal is to alleviate anxiety and invite students, through guided instruction, to identify their own mistakes. The approach toward this goal will vary among students; some prefer consistent, direct error correction and others do not. Example strategies are repeating an error in the correct form, expressing misunderstanding and asking the student to repeat, simply asking a student to think about whether their form was correct, involving the students in correcting each other, and writing their words on the board so they can see their own mistakes. It is important to convey that error correction is a form of teaching, not a cause for shame. With effective communication as the ultimate goal, there are valid arguments for more and less error correction at varying levels of the language acquisition process. At this juncture, the specific classroom culture plays a significant role in determining how error correction will be implemented.

At all levels, student-centered formative assessment emphasizes process learning. Struggle, critique, and revision should be celebrated as the process of learning and students should be given the opportunity to set goals, identify problems, design solutions, and engage others for feedback. This provides, again, an opportunity for the student to formulate his or her love of lifelong learning by focusing on process learning. Grading or scoring is based upon the students' engagement in the multi-step process of design and revision instead of a one-

chance final performance.

In student-centered classrooms, summative assessments are often tied to the lesson's activities, such as the final result of a multi-step project, presentation, or assignment. Because students internalize learning differently, the way that they demonstrate understanding may also vary. Traditional testing methods do not provide an equal ground for assessing student understanding, and, more importantly in the realm of language learning, assessing students' appropriate and effective use of the language. Is it not possible to widen the opportunity for students to demonstrate summative learning? Giving students the choice to submit a writing assignment, deliver a verbal presentation, or prepare a digital project as a final assessment allows them to determine how to show their very best in the classroom with confidence that they can apply their new knowledge outside the classroom as well. An additional effective assessment method is self-evaluation and reflection, which promotes critical thinking, personal responsibility, and forward-thinking learning.

The use of technology is essential, but in a student-centered classroom, technology is valued as a support tool for learning and not the primary goal in itself. In other words, technology should be leveraged to promote intellectual inquiry, creativity, and ongoing feedback. For the teacher, technology can offer student data to the teacher that aids in restructuring lessons for effective learning. For the students, communication through digital tools is a critical objective of learning a second language in the 21st century. There are many uses of technology untraditionally employed in the language classroom, such as filming, editing audio/video, or creating websites, that can be tremendously useful for students to develop unique skills and demonstrate their language learning.

Finally, student-centered learning addresses classroom management and discipline from a sense of inclusiveness and personal responsibility. In addition to school policies and consequences, students should understand the classroom expectations, which, when created collaboratively, instill individual and group accountability. Asking students to collectively design their own learning environment is an excellent way to begin a new course and establish a healthy culture of collaboration and learning. When these group expectations are unmet, teachers should commit to helping students maintain a sense of self-identity by not berating a student publicly or privately, or attacking the person in lieu of the problem. It is possible to calmly and positively present the problem and then require that the student take responsibility for the solution. The end goal is to teach students responsibility for their own actions in the classroom, and thus their own learning.

In summary, deep, effective, and long-term language learning is substantively enhanced by the student-centered learning approach, an approach characterized by independent learning in a collaborative environment. Teachers transform into guides while students are elevated to active leads. In addition to such a change in roles, student-center learning transforms instructional methods, assessment, and the physical classroom environment. This is by no means a natural or easy adjustment from traditional teaching pedagogy. Obstacles to implementing this approach include resistance from students, maintaining a rigorous content schedule, and mandated assessment methods. Overall, change is always difficult and will require dedication, ingenuity, and trial and error. However, the research-proven outcomes of student-centered learning are well worth the effort. When students are given active learner status, they grow in independence, critical thinking, and leadership. For the language classroom, student-centered learning meets the goals of developing student confidence, a positive attitude toward learning, and a sense of self-identity alongside growth in authentic language acquisition. There is nothing more fulfilling for teachers than to equip and motivate their students for lifelong learning. It is a privilege, indeed.

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Status of Secondary and Higher Secondary Education during Covid-19 of Bangladesh

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The Covid19 crisis caused severe impediments, thousands of unwanted deaths, major healthcare setbacks, massive unemployment, and learners out of schools across the globe. The pandemic has created the largest ever learning disruption, affecting 1.6 billion students worldwide which have brought a new challenge to teaching learning. The research found that school disruptions led to slower academic progress nationwide, especially among disadvantaged students.

A joint study conducted by the government's Access to Information Program and UNICEF in last October revealed that the academic life of all the 4.18 crore students of the country from the primary to university levels was affected badly by the COVID19 outbreak. Lack of education will reduce the children's earning capacity in the future and that will incur a loss of $ 7,4 billion over 45 years of their lifetime, according to a UNICEF report released recently.

Educational institutions remained closed on March 17, 2020. Around 4.18 crore students, academic life from primary to university level, and the livelihood of thousands of teachers have been hit hard, according to the studies. Prolonged closures of educational institutes in Bangladesh due to the COVID19 outbreak, will hit a group of learners becoming dropouts of school. Many non-government and private educational institutions teachers lost their jobs or received partial wages as they did not get tuition fees regularly. They have been living a subhuman life along with their families amid the pandemic due to financial crunch.

It became impossible for the government to hold Higher Secondary Certificate [HSC], Junior School Certificate [JSC] Primary Education Completion examinations [PECE], and their equivalent exams in 2020 due to the ongoing pandemic. Students were given auto–

promotion in the examinations. The situation is still uncertain for holding the current year examinations. Teachers and students became estranged for around one and a half years as in- person learning was halted. Learners have been undergoing severe mental stresses and trauma confining at home which is very disastrous. They have lost touch with the part of schooling that is slowing down their academic activities and growth. Many of the students have become addicted badly to the online game, caused great concern and worry among the guardians.

A significant number of students, especially the disadvantaged group can't get access to the remote learning platforms due to Resource constraints – such as lack of devices, tools, and internet facilities which has also been creating a digital disparity and a huge gap in society. A non-government organization, Campaign for Popular Education [CAMPE] showed a statistics in last October that 69 percent of primary and secondary students failed to attend the classes, broadcast on Sangsad Television, radio, and other online platforms. The statistics also showed that 58 percent of the students had no devices. Power and Participation Research Center [PPRC] and BRAC Institute of Governance and Development [BIGD] conducted a survey nationwide on 4940 households and finds that around 19 percent of learners in

primary and 25 percent learners at the Secondary level have been facing the risk of learning deficiency.

Manusher Jonno Foundation [MJF] revealed a statistics that some 13886 girls became the victim of child marriage during the last seven months of lockdown [April. 2020- October, 2020] last year in 21 districts of the country. Around 1.7 percent child marriages took place in a day during the months that shows a dark scenario for the girls' empowerment. Furthermore, the lack of sufficient trained teachers conducting digital teaching-learning, method, and evaluating the learners virtually during the ongoing lockdown has become a threat to the Universal Education policy of the government.

So, it has become a great challenge for us to meet the target of SDGs by 2030 and the national target by 2041 if the pandemic continues for more days.

The pandemic has also created some opportunities despite the entire crisis. It adds value and has created deeper dimensions in teaching-learning. Digitalization has been accelerated in our national life which is a significant advancement to reach the vision of the country set by the Government in 2009. The country has witnessed an unimaginable development of Information Technology [IT] which has facilitated interconnectivity not only among individuals but also among nations. ICT skills for remote teaching- learning platforms, online business and connecting office from home virtually have added a new dimension to our life.

Digitalization has offered us ample scopes of learning. There are thousands of content, platforms. apps and materials are available to learn innovatively. There are plenty on the net to supplement or complement which are not in the books. It is the learning beyond syllabus and borders. The government introduced Sangsad TV and radio broadcasts for virtual classes soon after the pandemic. Teachers switched on remote learning platforms having no training at all. They like other frontline workers joined the fight against the virus attending the virtual platforms. Teachers have faced difficulties initially attending the class. With time, a section of teachers has become succeeded to set a new trend of virtual teaching-learning in the country. They almost adapted to the new normal situation. The government has been planning to set up a separate TV Channel for Education and a massive training program for the teachers on remote teaching-learning.

There were several remote learning platforms functioning at present in the country. Even the schools have launched their individual virtual platforms to connect the students. The government has introduced assignment based teaching-learning in the schools aiming to keep the students concentrate on the learning process which adds a new dimension in education and develops deeper learning and professional skills.

The largest online teacher's portal Access to Innovate [A2I] under ICT division, different remote learning schools and even the universities also have taken intensive measures for upskilling the teachers in remote teaching-learning and different teaching approaches during the pandemic.

Virtual the platform has also led the way of 'Moving towards International Education and Exchange' which has a huge advantage of learning creating a sense of internationalism among the teachers and learners.

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Being an ACCESS "Auntie" Has Changed My Mindset

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It was September 2020 when I was informed by the Binational Center I work for, in Bogotá, Colombia that I would back up some Alumni activities, among them extracurricular ones that were developed with social responsibility programs. That is why, I started to work with Access students, not as the headteacher (dad or mom) but as the extracurricular activities' leader (auntie). Being there, listening to students in different contexts, seeing how they interacted among them and basically sharing time with them changed my mindset in three different ways.

GOING THE EXTRA MILE

I have always thought that as teachers, we are constantly learning. To teach a class, you should go and check the content of the lesson on your own, you should self-assess and see if you really understand a topic and look for strategies to make yourself understood once going over it with your students. But what happens when there is no content, no grammar, no pronunciation feature to teach? When I started working with Access, I found myself in front of a group of students who already knew grammar features, pronunciation aspects, and language principles. They all were finishing their second year as Access program students and therefore they were able to use the language properly most of the time. At this point, I did not have anything to teach them and that was not part of my role, either. They knew many things about English but needed to be taught something beyond this, more thorough, something that went beyond, something that could match life lessons and experiences.

At first, this task was not easy; what to teach, how to do it, and of course how to focus my attention on the person in the most inner dimension of the student. So, I had to go my extra mile and seek what they really needed. What was it that was going to stay with them even when they forget to conjugate the verb for third-person singular in present simple? One of their biggest desires was to listen in their conversations, having an impact on their closest community. Hence, I learned that being an auntie for them was not just to teach them a lesson, or to plan a workshop, but to show them the way to achieve their dreams. I had to learn to step aside and seek help from professionals such as leaders, psychologists, entrepreneurs that could guide our paths beyond the classroom.

PUTTING THE BALL ON THEIR COURT

But that was not all that I learned as an Access auntie. Listening to their stories, experiencing their ups and downs gave me a big lesson as well. As a teacher, you develop a clear mindset as a speaker, and you are used to having the lead of the class displayed by the teacher talking time. And that is complemented by my personality, I usually like to listen, and even though I listen, I mainly focus on being the speaker of the conversation when I talk to people. However, this Access family taught me I had to be the listener and even when I wanted to express myself first, I had to see how important it was for them and for me to let them talk first. Being the listener was empowering for them and inspiring for me.

I learned that they could take the lead of the conversation without me being there before. I learned that I had to put the ball on their court and see how they could come up with their own moves on

the field. And this taught me the value of autonomy which means that they were capable to do things on their own without me being always there, the power of teamwork was revealed. The fact of talking first and feeling the ball on their court helped them open their hearts and minds and, from their peers, from themselves, they could learn way more than what I could teach if I talked first. That meant, they could be the ones starting to move the ball on their court and determining its path, the leadership of the match, and even the league.

NOT JUDGING A BOOK BY ITS COVER

Not only did I learn to communicate with them effectively but also l acknowledged the fact there was a whole big universe in everyone, one that cannot be seen at first sight. My first encounter with them was tense, however, I must confess it was not because of them but mainly because of me. I had had the chance to share with Access students in camps and activities, but I had never had to be the leader of something like this. Through their Zoom videos, I could see bored faces, not interested ones, daring ones, and even some sad ones. I heard my boss introducing me to the group and asking people to turn on their cameras, a routine that I also started doing in my own sessions. But I need to be totally honest, I found it difficult to relate to them, some of them were interested but there were a lot who just did not seem to be into having these activities and even I felt they made up excuses for not following instructions. Although I thought they just did not want to be there, I kept treating them the same, with enthusiasm and I gave my best to be understanding with all the situations they told me they had faced. I started to call them by names and even chatted with them on a more personal basis and surprise, surprise!! The "reluctant" students I saw once, were the most participative ones in the sessions, the shy ones had the best ideas for projects and the list might be endless if I tell you here all the amazing leaders, friends, and people I could get to meet when I saw beyond the book cover. Some of them are now an active part of our Alumni network and they are involved in social responsibility activities as volunteers guiding other students' experiences and I am so glad to see their astonishing work, how they connect with peers and, I just feel so blessed that I had the opportunity of being an Access auntie.

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Education and Creativity

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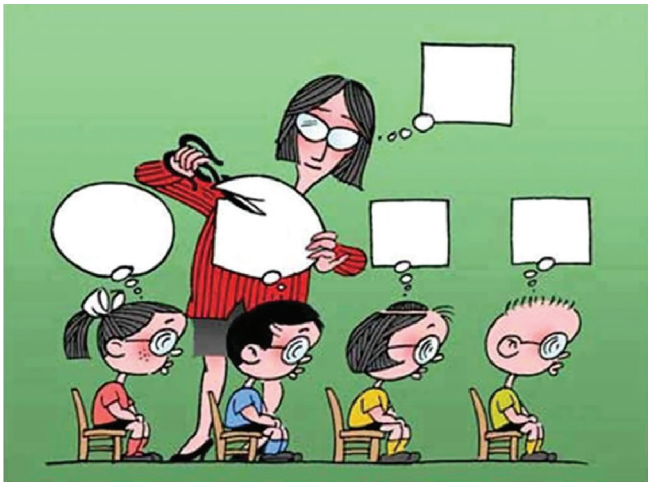
Entering the globalized, dynamic world elevates the role of the life competence of an individual capability of self-development, responsible, independence, and able to realize the purpose of life through personal choice. Creativity in education is becoming a priority value because it answers the question: how to act effectively in a world that is constantly changing.Today, as never before, the task of understanding and learning new pedagogical problems is acute reality, the creation of a new philosophy of education, open to the mysteries of human life. Undoubtedly, nowadays pedagogy is designed to analyze their own achievements, lessons, learn new values, and fasten creativity among the students. The children who come to school today must be ready to live in conditions of permanent changes, unpredictable situations now, and most importantly, they will have to master the most difficult of the arts - creativity to live.



Creative people are more flexible and skilled at solving problems, which makes them better able to adapt to technological advances and changes of any kind, as well as helps to take advantage of new opportunities. Many researchers believe that education has radically changed the lives of children and harmed their creative development. Teachers and educators offer children a variety of pre-thought-out images, props, and storylines that do not require imagination.

During the lesson, students no longer need to use their imagination or makeup stories: they can watch a video or cartoon, play an educational computer game. Constant repetition of the same thing, the excess of unnecessary information, which is often not necessary for successful self-realization in the future, turns the student into a “computer” that is devoid of creative thinking and used to act only on a predetermined algorithm. We can confidently say, if not about the absence at all, then a fairly small percentage of the presence of creativity in the educational process. Creativity is leveled, giving way to so-called “more necessary” subjects and “more correct” teaching methods.

Creativity is NOT an innate talent that only some children can possess, while others lack it. But in reality, creativity is more of a skill than innate talent, so teachers and parents can help their children develop it successfully. Albert Einstein claimed that he actually had no specific talent, that it was just his "obsession and dogged endurance" that helped him arrive at his world-changing ideas. He called creativity "Intelligence Having Fun"

The learning process should become a joint work of teacher and student. It is important for a teacher to become a student's guide to the world of creativity and help him to form creative thinking. To do this, you can only slightly change the usual exercises and tasks, giving students the opportunity to be creative. For example, instead of a ready-made training program or video, offer the students to create a mind-map, instead of the traditional task of "filling in the blanks" - to come up with the end of the story or change the character. For younger students, the space for creativity is endless. It is great to use not ready-made sets of solutions but to allow them to draw, construct from Lego, cut-glue, and so on. The development of creative abilities and project activities are very well combined. Provide a stimulating environment with lots of tools for creative work. Let your students create and they will surprise you with their progress and great results!

Further reading:

1. https://www.teachthought.com/learning/innovation-imagination-12-benefits-creativity/
2. https://positivelypresent.com/2018/08/creativity.html
3. https://slidetodoc.com/creativity-education-how-to-foster-more-creative-kids/
4. https://bookcreator.com/2019/08/how-do-we-foster-creativity-in-our-classrooms/
5. https://blog.wiziq.com/creativity-in-teaching-and-learning-book-review/

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My personal experience at the Access Program

Leidy Viviana Fernandez Burgos
Access Colombia 2019-2020

Imagen 1 Centro Colombo Americano https://www.colombobogota.edu.co/wp-content/uploads/2020/05/slides-colombo-niza.png

3 years ago, I started this experience in which I didn't learn only English, also an experience that helped me trust my intellectual abilities, be able to socialize and show a little more about me in another language. At the same time, I met people that I didn't think I knew and now I have a really good friendship with them, Access is a program that I had the opportunity to enjoy, and the following was my experience:

THE BEGINNING: 2019


U.S. EMBASSY BOGOTA
presents this
Certificate of Award
to participate in the
English Access Microscholarship Program to
Leidy Viviana Fernández Burgos
Se entrega el presente certificado por su admisión en el programa English Access Microscholarship de la Embajada de Estados Unidos.
Abril 3, 2019
Fecha
Michelle Riebeling
Janet A. Van Deren

My school was summoned for a scholarship that was about learning in English, I was selected with a partner. The same day I went to present the interview to acquire this scholarship, I remember myself in a long row and I was really nervous, I entered the interview and there were a woman and a man sitting, they asked me questions and we talked about my personal life. A funny moment was when I entered; I had a sheet in my hand, that sheet fell to the floor, the wind took it away and I got even more nervous and my face was really red. After 10 days the principals called me and they told me that I had been selected for the scholarship. This day I had my first class! They gave me a certificate of award.

My first teacher was really funny, she taught us a lot and we built a group union. I got to know my classmates, some of them at the moment are my friends. This teacher taught us the first semester we did activities, we learn English, talks with people from the United States and our first project. I did this project with my friends and was based on gender equality; we did a social experiment in public places.

The second semester we changed the teacher, the learning and the level was stricter, we only spoke in English and Elisabeth, a woman from United States, began to be part of our progress, she spoke about

her holidays, family, activities on Halloween and Christmas, she did a lot of funny activities with us. One day Elisabeth gave us some sweets from her country called "Candy Corn" (if you have curiosity the candy is delicious and their color is striking). As in the first semester, we did a project but with people that I didn't talk too much. The name of this project was "Big seeds" and was about the use of the seeds of the fruits and all the things we can do with the them like crafts, crops and not to throw them away. We did some crafts, surveys and talks in our schools.

HERE ARE SOME PHOTOS ABOUT THAT PROJECT:

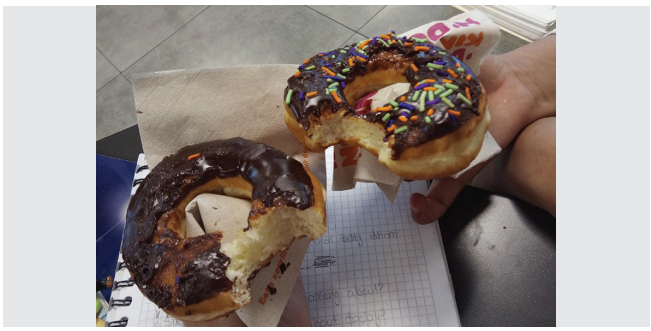
Halloween came in October! we did a costume challenge. The person with the best costume won! And there was a small celebration with all of my classmates, we danced, and in the special celebration the snack was special too!

WHAT CHANGED FOR ME THAT YEAR (2019)?

In the first semester I was really shy and for this reason I got very nervous and I didn't participate so much in class, I doubted about my learning, my grammar and pronunciation. With the time in the second semester, I felt more confident of myself, my pronunciation and grammar. I improved, to make mistakes, for me, was an opportunity to learn more and be able to be better, that was reflected when I expressed myself.

2020 WAS HERE!

A normal year started, all the world living their lives like another year, new goals, dreams and feelings.



In the third semester, a lot of changes came, new teacher, some new classmates and another person left, new friendship and the English level increased, but suddenly everything changed. A virus (Covid19) arrived to my country, the classes became totally virtual and was impossible to return face to face quickly. Work and study became secondary the health was first for everyone. All these changes in our last year with the scholarship turned this experience really different.

The classes were on "zoom", at the beginning our meetings were shorter than before but we kept having a good attitude. Always in all the classes the camera was on, we tried to participate always, days later we had meetings with Elisabeth to practice "leadership" the talks and activities also with the virtuality helped us to practice the language. We did some meetings with people from other countries like Egypt, Russia, Bangladesh and we knew a little of them, we shared a lot of nice activities, knowledge and a little bit of our lives. I became friend with a girl from Egypt, we made calls in that I told her things about my country, to someone who I didn't know anything about and she told me about her culture and country.

In our fourth and final semester the virtuality became normal for us, I missed face to face classes but the situation with the virus (Covid19) wasn't encouraging. In this semester the teacher was the same and the English level was in the final details. Elisabeth gave us tips for aa test that we had to take to finish our program, we did activities together. The day of the evaluation arrived and it was a perfect opportunity to meet again with my classmates. There was little left to finish the program and we did a (virtual) camp, we had many activities together, we sang, danced, cooked, exercised and a final video of our process and journey.

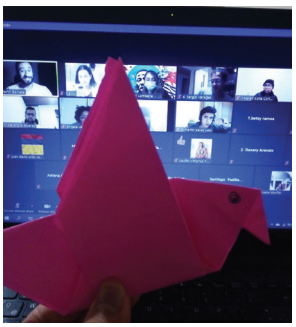
We finished! They gave us our final certificate B1 English Level, a complete process full of laughter, friendship, learning about everything, not only English but also values.

Totally unknown people who came together and formed a family, our dear Access family 2019-2020.

Our graduation was totally virtual, but with the same enthusiasm as always. Access taught me many things, I am really grateful for this opportunity and I hope all the people who come to this program enjoy it and have a lot of funny memories. I hope that they don't have fear of failing or making mistakes, and they speak the language with confidence without shame and if you can share your knowledge do it! Do it with love and always remembering your process.

A new year 2021!

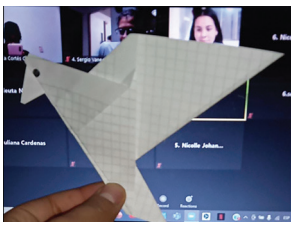
At the moment, after this experience I decided not leave the Colombo (our Binational Center in Bogotá) and I began to participate in their Facebook lives and meetings to people that finished their programs (Graduates).



In one occasion they told me one idea about volunteers as mentors of some people who are in programs similar to the one, I was, I joined this volunteering program as a mentor for 4 girls and we made calls, activities or challenges (#mentoringchallenge) in this space I also help them to clarify some issues they talk to me. Our schedule was divided, 1 week we have a meeting and other week we have challenges which we decide together or the organizers give us a specific challenge. It's really fun to be there, to meet people who are starting their program like me in the past, I am sure that as me their lives will change.

I usually practice English in those activities and with my friends that I made in the program we are very close.

Finally, I see myself two years ago (before I started the scholarship) and now I can assure that I feel confident in myself, in showing myself as I am, I can express myself better than before, I have had the opportunity to participate in exchange programs and know more about the world not only that surrounds me but also the ones that are far away from here. I was able to represent and show something from my country to people from different places through exhibitions.



Participating and always wanting to learn more is a good self-study habit I have acquired; we can't stop learning just because the program ended. We can search for options where we help each other and help more people progress and we keep learning with those experiences.

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Beyond The Pen And The Paper...

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The Access program is immensely responsible for the development of countless students in any mode of communication, allowing them to become more confident and efficient interactors who can sustain leadership roles alongside fulfilling the duties of a student. With communication being crucial in empowering and molding oneself into a leader, Access focuses firmly on this aspect.

However, like English- the global language- is a secondary language medium to us, for many this can be challenging to adapt to the phonetic, alphabetic, and morphologic structure required to set up a successfully interactive discourse or conversation. Access assists the student in enhancing communication fluidity by showing them that simply grammatical precision is not sufficient and qualities like confidence and tonality also count. One of the major issues that restrain effective communication is nervousness. Speaking a language other than their mother tongue puts the students in a tense situation as they subconsciously construct the sentence in their first language and then translate it to English before speaking up. This restrains them from maintaining posture and liveliness. It is essential to cut off this habit to be more confident and comprehensive while communicating. In the end, communication is all about expressing and that is exactly what the students need to learn.

Moving on it is also important to realize that communication is only a major part of leadership, not the entirety of it. One of the crucial issues that leads a student away from the path of an influential leader is their inability to differentiate between a dictator and a leader. Though the differences may seem apparent, reflecting this knowledge or understanding into actions can be challenging. Access tries to make sure that the students stand with their contemporaries and not above them, that they motivate and not order and that they lead and not dictate.

Another major aspect that Access deals with is the deteriorating global interest in science. Students of this era are more inclined towards commerce believing that science has fewer opportunities to offer, as is the issue in our country. However, access is trying to rekindle the long-lost interest of students towards science by discussing more deeply about this subject and by showing that there are numerous opportunities offered for a scholar of science as humanity needs them. STEAM (Science Technology Engineering Art & Mathematics) education encourages the students, especially the female, to accept subjects from science faculty and build their professional career based upon this field. Considering that STEAM is a global movement, it can be contemplated that, fueled by the rising number of students pursuing commerce above science, the demand for the students of science is global as well.

One method that the access follows to imply their support towards science and technology is the acceptance of 'digital learning' as a part of education, something that has escalated even further during this pandemic. Online classes, assignments, quiz, video clips etc. have been widely used to maintain a sustainable education for the students and therefore the convenience of technology has already been established. Access however has supported this method for quite a while to encourage diverse learning, varied resources, and flexibility. PowerPoint presentations for example, is one method used by the teachers very frequently in lecture classes to habituate the students with technology and indulge them into more digitalized, informative, and visually appealing discussions.

Once these issues are addressed, education will evolve further away from just a pen and a paper. The importance of communication, leaders, science, arts, and digital learning is slowly being acknowledged and international exchange is getting more support as the world grows smaller. A time where education becomes much more enjoyable and interesting is foreseeable.

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The Higg's Boson and SUSY

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School physics teaches that everything is made up of atoms, and inside atoms are electrons, protons and neutrons. They, in turn, are made of quarks and other subatomic particles. Scientists have long puzzled over how these tiny building blocks of the universe acquire mass. Without mass, particles wouldn't hold together and there would be no matter. One theory proposed by British physicist Peter Higgs and teams in Belgium and the United States in the 1960s is that a new particle must be creating a "sticky" field that acts as a drag on other particles.

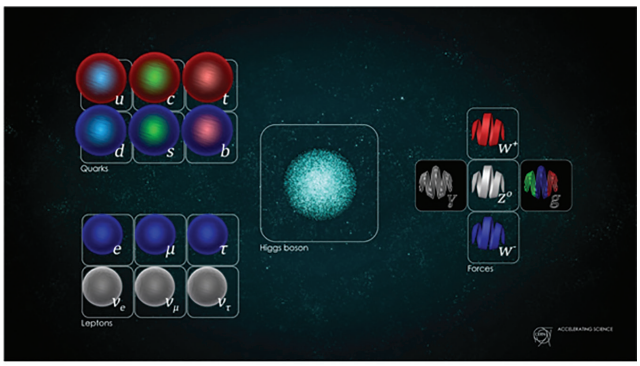
In order to truly understand what the Higgs boson is however, we need to examine one of the most prominent theories describing the way the cosmos works: the standard model. The model comes to us by way of particle physics, a field filled with physicists dedicated to reducing our complicated universe to its most basic building blocks. It is a challenge scientists have been tackling for centuries and have made a lot of progress. First, we discovered atoms, then protons, neutrons and electrons, and finally quarks and leptons. But the universe doesn't only contain matter; it also contains forces that act upon that matter. The standard model has given us more insight into the types of matter and forces than perhaps any other theory we have.

In brief, here's what the standard model, which was developed in the early 1970s tells us: Our entire universe is made of 12 different matter particles and four forces. Among those 12 particles, you'll encounter six quarks and six leptons. Quarks make up protons and neutrons, while members of the lepton family include the electron and the electron neutrino, its neutral counterpart. Scientists think that leptons and quarks are indivisible; that you can't break them apart into smaller particles. Along with all those particles, the standard model also acknowledges four forces: gravity, electromagnetic, strong and weak.

As theories go, the standard model has been very effective, except for its failure to fit in gravity. Armed with it, physicists have predicted the existence of certain particles years before they were verified empirically. Unfortunately, the model still had another missing piece -- the Higgs boson until 2012.

As it turns out, scientists think each one of those four fundamental forces has a corresponding carrier particle, or boson, that acts upon matter. That's a hard concept to grasp. We tend to think of forces as mysterious, ethereal things that do not have form or shape, but in reality, they're as real as matter itself.

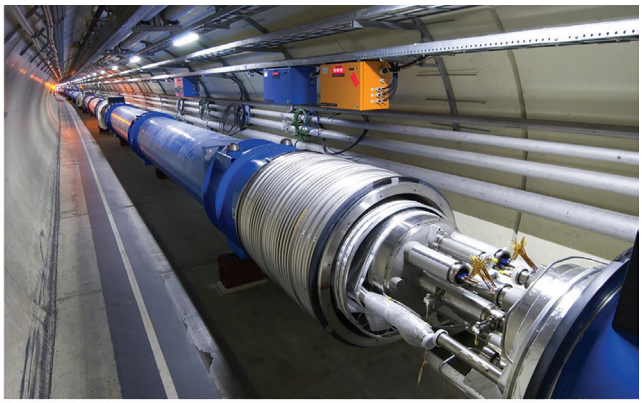
Scientists think each of the four fundamental ones has its own specific bosons. Electromagnetic fields, for instance, depend on the photon to transmit electromagnetic force to matter. Physicists think the Higgs boson might have a similar function – transferring mass itself.



The Standard Model
Source: https://home.cern/science/physics/standard-model

Can't matter just inherently have mass without the Higgs boson confusing things? Not according to the standard model. But physicists have found a solution. What if all particles have no inherent mass, but instead gain mass by passing through a field? This field, known as a Higgs field, could affect different particles in different ways. Photons could slide through unaffected, while W and Z bosons would get bogged down with mass. In fact, assuming the Higgs boson exists, everything that has mass gets it by interacting with the all-powerful Higgs field, which occupies the entire universe. Like the other fields covered by the standard model, the Higgs one would need a carrier particle to affect other particles, and that particle is known as the Higgs boson.

WHY IS THIS IMPORTANT? The Higgs is part of many theoretical equations underpinning scientists' understanding of how the world came into being. If it doesn't exist, then those theories would need to be fundamentally overhauled. The fact that it has now been proven that it does exist, means scientists have been on the right track with their theories. But there's a twist: the measurements seem to diverge slightly from what would be expected under the so-called Standard Model of particle physics. This is exciting for scientists because it opens the possibility to potential new discoveries including a theory known as "super-symmetry" where particles don't just come in pairs - matter and anti-matter - but quadruplets, all with slightly different characteristics.



The Large Hadron Collider, CERN.
Source: https://home.cern/resources/faqs/facts-and-figures-about-lhc

While the Standard Model has been largely successful in predicting what experiments have also corroborated, about the basic building blocks of matter, physicists also recognize that it does not give the complete picture and hence is incomplete. Supersymmetry is an extension of the Standard Model that aims to fill some of the gaps. Though supersymmetry initially seems to complicate matters by introducing a partner particle for each particle in the Standard Model, the new particles solve a major problem with the Standard Model – fixing the mass of the Higgs boson and if the theory is correct, supersymmetric particles should have appeared in collisions at the LHC. But they didn't!

The two leading theories attempting to explain the absence are (a) that the particles are too massive to show up at the energies that LHC can muster, (calling for a more powerful collider in the future), and (b) the new particles are very short lived and decay into low energy Standard Model particles. Of late, assuming that Supersymmetry or SUSY in short is present but much stealthier than previously thought, machine learning coupled with neural networks is being put to use. This method looks for the production of two SUSY top quarks called squarks and their subsequent decay to two top quarks and many other jets. But this end result of many jets is not unique as many other processes also produce jets at the end. However, the top squark usually produces more sprays than other background processes. If this version of SUSY is correct, as opposed to the one with a lot of missing energy at the end, it explains why previous searches have not found anything.

One of the reasons for the Standard Model being so attractive to physicists, is that it has the potential to take physics beyond the realm of the 4% that we know of now. Let's delve a little. A cursory look at the Standard Model gives the impression that the theory predicts all particles should be massless. But our observations on fundamental particles clearly is at odds with this. The Standard Model, gets around this problem by proposing the existence of the Higgs boson, as explained above. But it is puzzling why the particle that gives mass to all other particles, itself should be light, as interactions with other particles of the Standard Model will tend to make it very heavy! This is where the role of SUSY comes in. The extra partner-particles predicted by SUSY will cancel out the interactions by the Standard Model partners, making the Higgs boson light. What is more, the inclusion of SUSY particles allows the interaction using the same fundamental forces, but allows particles to have different masses. Another problem solved! There's more: the inclusion of the

SUSY particles in the Standard Model predicts that the three fundamental forces – electromagnetism, and strong & weak nuclear forces would have the same exact strength at very high energies, as was the case in the early universe, just after the Big Bang, thus moving in the direction of the Grand Unification Theory that Einstein was working on when he passed away.

A further step in the direction of unification is that the different classes of particles, fermions having half integral spin (obeying Fermi-Dirac statistics) and bosons with integral spin (obeying Bose-Einstein statistics) can be brought together under one umbrella by the SUSY particles.

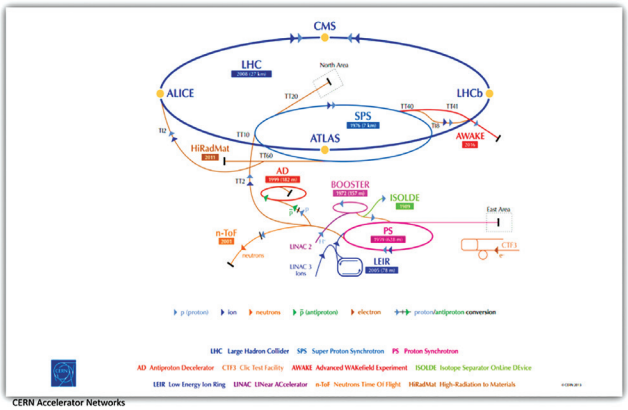
Another reason making the Standard Model along with the modifications of Supersymmetry so attractive is that many theories have predicted that the lightest of the SUSY particles to be stable and neutral electrically, interacting very weakly with the particles of the Standard Model. Now, these are the very characteristics that fit the role for dark matter. Dark matter, as we understand, makes up most of the matter in the universe. It is also responsible for holding galaxies together. While the Standard Model alone is not an answer to the explanation for dark matter, Supersymmetry builds on the framework laid down by the former to build a more wholesome picture of the universe. Certainly, more experiments need to be done and more theoretical alternative models need to be developed to be able to probe deeper into the workings of the universe with some certainty.

HOW MUCH DID IT COST? CERN's atom smasher, the Large Hadron Collider, alone cost some $10 billion to build and run. This includes the salaries of thousands of scientists and support staff around the world who collaborated on the two experiments that independently pursued the Higgs, the ATLAS Experiment and the CMS, placed diametrically opposite each other along the LHC ring.

Each experiment was designed, maintained and performed by a different group of experts. Each team competing against the other while looking for the same piece of the jigsaw puzzle; and when it was discovered, both teams reported similar observations and results! Woohoo!

WERE THERE ANY PRACTICAL RESULTS FROM THE SEARCH? Not directly. But the massive scientific effort that led up to the discovery has paid off in other ways, one of which was the creation of the World Wide Web. CERN scientists developed it to make it easier to exchange information among each other. The vast computing power needed to crunch all of the data produced by the atom smasher has also boosted the development of distributed - or cloud - computing, which has now made its way into mainstream services. Advances in solar energy capture, medical imaging and proton therapy - used in the fight against cancer - have also resulted from the work of particle physicists at CERN and elsewhere, giving hope and extending life to hundreds of people.

WHAT'S NEXT? "This is just the beginning," CERN scientists say. Scientists will keep probing the new particle until they fully understand how it works. In doing so they hope to understand the 96 percent of the universe that remains hidden from view. This may result in the discovery of new particles and even hitherto unknown forces of nature.



CERN Accelerator Networks
Source: https://home.cern/resources/faqs/facts-and-figures-about-lhc

Physicists understand that to be able to probe nature and its forces along with their exchange particles, accelerators working at energies higher than that of the Large Hadron Collider have to be built. Now, the smaller is the curvature of the beam pipes of the accelerator, the higher can be the energies achieved. This translates literally to having larger accelerators. The present LHC has a circumference of approximately twenty-seven Km and is ultimately capable of producing collisions at 13 Tev (6.5 TeV per beam), after going through a series of energy increasing steps. It works at a dipole operating

temperature of 1.9 K or -271.3oC. There are 9593 superconducting magnets, 1232 main dipoles, 392 main quadrupoles. There are 2802 bunches per proton beam, with 1.2 x 1011 protons per bunch at the start. The beam makes 11245 turns per second enabling one billion collisions per second! If none of that impressed you, maybe this will – consider the power consumption by the LHC: The total power consumption of the LHC (and experiments) is equivalent to 600 GWh per year, with a maximum of 650 GWh in 2012 when the LHC was running at 4 TeV per beam. For Run 2, the estimated power consumption is 750 GWh per year. The total CERN energy consumption is 1.3 TWh per year while the total electrical energy production in the world is around 20000 TWh, in the European Union 3400 TWh, in France around 500 TWh, and in Geneva canton 3 TWh. (Source: https://home.cern/resources/faqs/facts-and-figures-about-lhc)

Now, that's not enough (!) and a much larger accelerator, the FCC has already been designed. One of the major goals of the FCC is to reach collision energies of 100 TeV from the present 13 TeV, so that heavier particles can possibly be observed in the collision process, pushing the boundaries of knowledge to new frontiers. For this, more than 150 universities, research institutes and industrial partners from all over the world will be collaborating. The beam pipe in this case is about 100 km in length, an upgrade of about four times from the present 27 Km!

Truly, all the wonder that we see around our universe, is just 4% of the total and it bewilders us with its size, beauty and complexity! Wonder what surprises lie in the 96% that remains hidden. Would it ever be possible to "see" or even comprehend that hidden part? What would be the costs involved? Or is it a limit of Nature like the speed of light that we will never be able to achieve? The answers to all these questions lie in the future.

Suggested Readings:

1. https://home.cern/science/accelerators/large-hadron-collider
2. https://home.cern/resources/faqs/facts-and-figures-about-lhc
3. https://home.cern/science/physics/standard-model
4. https://en.wikipedia.org/wiki/Standard_Model
5. https://www.quantamagazine.org/a-new-map-of-the-standard-model-of-particle-physics-20201022/

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ACCESS
Adoption of Contemporary research Concentrating Education, Science & Social Studies
JOURNAL

Access Program : A life changing experience

Miguel Chenal
Access Alumni, Guatemala

My Access story starts back at the end of 2015 when I applied for the Access scholarship. In the beginning, the only thing I wanted to was learning English. Very little did I know about the avalanche that was on my way in the coming years. I got admitted to the Access program in 2016 and there is where everything changed. During my 2-year experience, I was introduced to whole new perspectives and horizons that I never thought I could be part of.

In Access I learned about the importance of serving others and being proactive in my community. Service-learning was a part I enjoyed and that eventually led to very successful projects in my town such as a tourism project and a cleaning project that were supported by our municipality. Aside from projects and English skills, Access personally helped me to be more confident, to challenge myself to get out of my comfort zone, and to look for solutions rather than problems. This was the first time that the idea of dreaming big sounded possible to me. When I graduated from the program, I thought everything was over and all that was left for me was getting back to my normal lifestyle.

In 2018 I made the decision to apply to the SEAL scholarship. A scholarship focused on teaching and service-learning skills. Around May of the same year, I was accepted, and that year felt like a "game-changer" to me. Thanks to the SEAL program I became an English teacher and met wonderful teachers and classmates that eventually turned to be more like a family and such splendorous support in my life.

In 2019 I was offered to be a volunteer in AJEDE and in the administration of the English Language Programs in my city. That decision was an unexpected gateway to bigger opportunities. Later that year I had the opportunity to meet the US ambassador in Guatemala and to be a teacher in one of the programs.

Currently, I am the sub-coordinator of AJEDE in my city and I also co-coordinate international book clubs and programs between California State University Bakersfield and the English Language Programs in Guatemala. When I look back and reflect on what my life has been in this past 6 years, I can say that I never thought I would be doing what I do now. Access program is a life-changing experience.

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Barriers to Learning

Udovenko Alice
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Many people face challenges in learning a foreign language. I have been learning English since December 2019 so I can give you some piece of advice how you can break your fears.

First of all: You should let yourself make a mistake.

The interesting fact that a lot of people who start to learn a new language thinking that I am not smart, i can't understand material and something wrong with me. It is a very common problem and some people stop learning. But you should understand that it is normal when you make a mistake. You aren't a robot. In the beginning you can't do everything right. So when you start to learn a new language – make a mistake. You can have a great experience and you will get habits which help you in the future.

The second step is: Learn more words. That makes you feel confident.

I know it is boring and complicated. But if you want to order a coffee in the café you need to know which words you can use. By the way, now we can find special way to learn new words for yourself. For example, make a lot of stickers with words and put in your flat. Or every day learn 10-15 words. An easy way to learn new words is watching series and films which you have watched several times. Because you know the plot and you can remember some words in different topics. The most popular way to learn new words is online courses. It is really convenient, because during the lockdown you have possibilities to learn more information.

The third steps is: Stop thinking that you are speaking badly, awfully, strangle and something like that.

I had this problem when I started my learning. It isn't easy, believe me. Be confident, don't be cruel to yourself. You should understand that the more you talk the better speaker you become. If you are scared to speak with someone you can start to speak with yourself. Tell how your day was, about plans in the future, your studying and something like that. You will soon feel more self-motivated and stop feeling scared anymore.

All in all, you should accept that learning a foreign language is a fun challenge, and surely the barriers will arise. As you encounter these barriers, remember, it takes your time and effort, but it`s worth it. Don't forget to enjoy your life. Everything will be fine!

About GEIST

February 12, 2017, GEIST International foundation has been pledge bound in ensuring the overall development of the society by overcoming the long-standing problematic factors that constrained the wheel of development. GEIST is fundamentally the outcome of the collaborative initiatives of the State alumni in Bangladesh. These alumni, mostly teachers, were selected for different exchange programs by the U.S. Department of State through some rigorous processes. Their visits to different institutions across the country instilled them with distinct skills and knowledge. Upon their return from the programs, the alumni have been cascading their achievements to make a meaningful impact back to their communities. Working as a non-profitable charitable organization, in last four years, GEIST has been growing up as a much trusted platfrom of shared growth in the global State alumni community and others. Evidenced by some remarkable programs, it has embraced the legitimate voices, needs and interests of scholars and learners from over forty countries representing six continents.

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