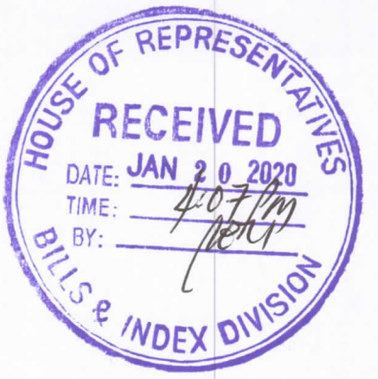

Republic of the Philippines
HOUSE OF REPRESENTATIVES
Quezon City

EIGHTEENTH CONGRESS
First Regular Session

House Bill No. 5960

Introduced by **Rep. LAWRENCE LEMUEL H. FORTUN**

EXPLANATORY NOTE

The world is bracing again for the full realization of an industrial revolution, the 4th Industrial Revolution (IR 4.0). We already experienced one in the 70's and 80's with the 3rd Industrial Revolution with personal computing and internet changing the society –from manufacturing, business, banking, governance, communication, entertainment, to education. Amidst globalization and the ever dependency on digital technologies, there is an urgent need to prepare for the volatile, competitive, and complex world of work driven by the new disruptive technologies of IR 4.0, among which are artificial intelligence, robotics, internet of things, 3D printing, blockchain, and other technologies.

With this global trend considered, we will, thus, need to prioritize re-contouring our education system to produce competitive, industry-aligned, internationalized "new-collar workforce" from Generation Z [13-19 years old] Filipinos. By doing so, our future graduates will have the competency and skills to thrive in IR 4.0 that otherwise augur mass unemployment, displacement of outdated workforce, and demand for new specialist roles in a global labor market that leverages on the emerging technologies and requiring heightened levels of complex problem-solving skills, critical thinking, and creativity, according the World Economic Forum.[1]

As we climbed up to the 54th rank in the Global Innovation Index in 2019, it may be more difficult for our country to reach even greater heights given the grim state of Science, Technology, Engineering, and Mathematics (STEM) education in the Philippines. Out of the 3,589,484-tertiary enrolment in the 2017, only 35% of Filipino students chose STEM. This trend is aggravated by the dismal completion rate of only 20% in our State Universities and Colleges (SUCs). UNESCO recommends that for a country to be competitive in the knowledge economy, it needs to have at least 380 scientists per million population. The Philippines registers only at 189 lagging behind its ASEAN neighbors: Vietnam at 674, Thailand at 974, and Malaysia at 2,100 per million. With a backlog of developing at least 19,000 Filipino scientists, this is a serious challenge for our country given the shortage of STEM graduates and a generation of Filipino youth with low interest in STEM.

[1] World Economic Forum. (2018). *The Future of Jobs Report 2018*. World Economic Forum, Geneva, Switzerland.

STE*A*M (Science, Technology, Engineering, Arts, and Mathematics) education has emerged as a new educational framework aimed at addressing the need to improve student interest and skills in STEM fields. A huge number of empirical researches show that STE*A*M provides higher student engagement and self-motivation than STEM alone does. STE*A*M creates inspiring learning paths that produce students who are not just content-memorizers, but also learners who can "think outside the box" and work in teams with people of diverse expertise[2]. The new competencies expected from STE*A*M education, such as creativity, critical thinking, empathy, and humanism, are essential traits that improve employability skills necessary for career and economic advancement and can contribute, on a macro-level, to a robust innovation ecosystem. Of note, many Nobel laureates have been linked with diverse artistic endeavors such as photography, music, performing arts, visual arts, and creative writing[3].

In the Philippines, Arts and Culture in mainstream education, sadly, are merely regarded as just "icing on the cake" with our schools showing marginal appreciation and support of their greater value in educating and molding the Filipino youth. In a recent project led by Philippine Normal University entitled, "TPACK in Philippine STEAM Education" funded by the Commission on Higher Education (CHED), it was shown that around 90% of teachers in the lower brackets of State Universities and Colleges (SUCs), Local Universities and Colleges (LUCs) trained in STEM disciplines perceive themselves poorly in pedagogy and technology integration when delivering lessons or disciplinal content. Old ways of teaching cannot entice the best Filipino learners to choose STEM for their careers. As per assessment, teachers crave for capacity building to strengthen their technology, pedagogy, and content knowledge (TPACK). There are also several challenges, as cited in the research, such as institutional affordances, availability of tools and resources, administrative support, connectivity, and even practices and culture.

Pursuant to this emerging development, this bill seeks to address the national need to re-model STEM education to be supported by the Arts and Culture in view of the powerful role STE*A*M plays in fostering innovation and economic growth, stimulating the development of innovative and creative industries, and creating a lifeline to sustained employability and skills-relevance of millions of Filipinos in the challenging era of IR 4.0.

More importantly, this bill seeks to provide a roadmap for STE*A*M to empower our learning institutions, from basic to higher education, and educators to be able to weave the magic and colors of STEM and to bring Filipino students the awe of education and curiosity that can infect every aspect of their capability and aspirations.

In view of the foregoing, the immediate passing of this landmark bill is fervently sought.

LAWRENCE LEMUEL H. FORTUN
1st District of Agusan del Norte

---

[2] Perignat E & Katz-Buonincontro J. (2019). STEAM in practice and research: An integrative literature review. *Thinking Skills & Creativity*, 31:31-43.
[3] Root-Bernstein R. (2015). Arts and crafts as adjuncts to STEM education to foster creativity in gifted and talented students. *Asia Pacific Education Review*, 16(2):203-212.

Republic of the Philippines
HOUSE OF REPRESENTATIVES
Quezon City

EIGHTEENTH CONGRESS
First Regular Session

House Bill No. 5960

Introduced by **Rep. LAWRENCE LEMUEL H. FORTUN**

AN ACT INTEGRATING THE ARTS (A) INTO SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) ESTABLISHING STEAM IN BASIC AND HIGHER EDUCATION, PROMOTING CAPACITY BUILDING FOR EDUCATORS, PROVIDING FOR ITS FINANCING, AND MANDATING SCHOOLS TO INSTITUTIONALIZE STEAM EDUCATION TO CONTRIBUTE TO SCIENCE AND TECHNOLOGY (S&T), INDUSTRIAL DEVELOPMENT, AND TO ENHANCE THE CREATIVE POTENTIALS AND HOLISTIC DEVELOPMENT OF FILIPINO STUDENTS IN THE 4TH INDUSTRIAL REVOLUTION

Be it enacted by the Senate and the House of Representatives of the Philippines in Congress assembled:

SECTION 1. Short Title. – This act shall be known as "Philippine STEAM Act of 2020."

SEC. 2. Declaration of Policy. – It is hereby declared the policy of the State to give priority to education, science and technology, and arts and culture, as well as, to encourage and support the country's educational institutions at initiating and implementing curricular reforms and capacity building programs for educators thus fortifying the human capital substrate on which the country builds socio-economic progress and scientific and technology competitiveness and industries.

Towards this end, it is acknowledged that education is a principal, if not, the major instrument for creating a generation of Filipinos capable of producing knowledge, innovation and technology; with enhanced critical thinking skills, creativity, and problem-solving skills suited for the future world of work; imbibed with pride and deeper understanding of our nation's heritage and culture, and appreciation of the arts.

The State shall further endeavor assisting both basic and higher education institutions to deliver accessible, holistic, integrated, and quality education relevant to the changing needs of people and society in the Fourth (4^{th}) industrial revolution.

SEC. 3. Definition of Terms – As used in this Act:

a) ***Fourth Industrial Revolution (4th Industrial Revolution)*** refers to an era largely driven by the convergence of digital, biological, and physical innovations that will unfold over the 21s century.

b) ***Research & Development (R&D)*** refers to activities institutions or agencies undertake to obtain new knowledge that may be used to innovate or create products (technology, services, or systems)
c) ***STEM*** refers to an educational approach using the four disciplines of Science, Technology, Engineering, Mathematics in an interdisciplinary way to teach STEM lessons.
d) ***STEAM*** refers to an approach to learning that uses the four disciplines of Science, Technology, Engineering, Mathematics with the integration of the Arts as access points for guiding student inquiry, dialogue, critical and creative thinking.
e) ***Technological Pedagogical Content Knowledge (TPACK)*** refers to a framework that defines the knowledge educators need to assimilate to best deliver their content or lessons. It is a framework that guide educators to weaving of content, with technology and deliver these lessons as suited to their learners to achieve the goals of education.

SEC. 4. The STEAM Inter-Agency Council – A STEAM Inter-Agency Council, hereafter known as the STEAM Council, headed by the Department of Science and Technology (DOST) and composed of the National Commission on Culture and the Arts (NCCA) , Commission on Higher and Education (CHED), Department of Education (DepEd) and the Department of Trade and Industry (DTI) is hereby created.

The STEAM Council shall be chaired by the Secretary of DOST and the members shall be the Secretaries of the DepEd and the DTI and the Chairpersons of the CHED and the NCCA. The Chairperson of the STEAM Council may designate an Undersecretary or Assistant Secretary as his or her representative. The members may also designate accountable representatives who must at least be with the rank of Director. The STEAM Inter-Agency Council shall meet at least once every quarter.

For purposes of this Act, the Science Education Institute of the Department of Science and Technology shall act as the Secretariat of the STEAM Council.

SEC. 5. Mandate of the STEAM Inter-Agency Council. The STEAM COUNCIL is mandated to do the following:

a) Formulate a national strategic plan to encourage and facilitate the establishment and institutionalization of STEAM programs in all basic and higher educational institutions, both public and private;
b) Formulate a National Research Agenda for STEAM. that will be evaluated and updated every five (5) years;
c) Ensure that STEAM program standards and guidelines, faculty competence and capacity building programs in TPACK, R&D, institutional standards, and higher education extension programs are aligned to the needs of the education, S&T and industry sectors, with both local and global perspectives;
d) Ensure access and accountability to promoting equity in and improving the quality of STEAM in basic and higher education;
e) Engage in national and international partnership and networks for STEAM R&D, policy and programs; and

f) Ensure sustainability of resources to achieve the best quality and standards for STEAM education and programs, faculty capacity building, and institutional capacity;
g) Develop a governance structure of the Philippine STEAM System to efficiently and effectively carry out the provisions of the Act.

SEC. 6. Sustaining STEAM, R&D and Continuous Quality Improvement and Offerings. - The DOST, in partnership with CHED, DEPED, and NCCA, shall support the conduct of continuing R&D by educational institutions to help in the continuous improvement of the STEAM education programs for the purpose of enhancing knowledge, improvement of TPACK and practices, and revenue generation consistent with Republic Act 10055 otherwise known as the Technology Transfer Act of 2009.

SEC. 7. Appropriations. - The amount necessary to carry out the provisions of the Act shall be charged against the current year's appropriation of the DOST, CHED, DepEd, DTI, and NCCA. Thereafter, the amount necessary for the continued implementation shall be included in the annual General Appropriations Act and in the internally-generated funds of DOST, DepEd, CHED, NCCA, DTI, including the State Universities and Colleges (SUCs).

SEC. 8. Implementing Rules and Regulations. – Within ninety (90) days from the approval of this Act, the Inter-Agency Committee shall formulate the rules and regulations implementing the provisions of this Act. The implementing rules and regulations issued pursuant to this section shall take effect thirty (30) days after its publication in a national newspaper of general circulation.

SEC. 9. Repealing Clause. – All laws, decrees, orders and rules and regulations contrary to or inconsistent with the provisions of this Act are hereby repealed or amended accordingly.

SEC. 10. Separability Clause. - If any provision of this Act is declared unconstitutional, the same shall not affect the validity and effectivity of the other provisions hereof.

SEC. 11. Effectivity. – This Act shall take effect fifteen (15) days after its publication in the *Official Gazette* or in a newspaper of general circulation.

Approved,