

Exhibit 1: Structure of Basic Education

Level	Years	Grades
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The objectives of K to 12 education in the Philippines are as follows:

- Strengthening early childhood education (universal kindergarten)
- Making the curriculum relevant to learners (contextualized and enhanced)
- Ensuring integrated and seamless learning (spiral progression)
- Building proficiency through language (MTB-ME)
- Gearing up for the future (senior high school)
- Nurturing the holistically developed Filipino (college and livelihood readiness, 21st century skills)

DepEd is continuously addressing the challenges of basic education in the Philippines by making access to basic education a key priority of the government. Access to education is the initial avenue for helping Filipino learners achieve a promising future. At present, the Department is responding to the challenge to of improving students' learning performance. This goal is part of the 10-Point Education Agenda of the Secretary of DepEd, which seeks to harness cooperation with the private sector, communities, and bilateral and multilateral institutions to upgrade the Department's communication strategy, so that it can reach out to local, national, and global communities.

S E K is a national effort initiated by DepEd to address the challenge of providing quality basic education.¹ As a rallying call, DepEd aims to align all of its programs and projects toward *E K* and is mobilizing field offices and schools to address gaps, improve student performance, and prepare students with essential global and 21st century skills.

With the Filipino learner as its core, *S E K* has four pillars (designated with the acronym KITE):

- *K* to 12 Curriculum, Delivery, and Instruction—This pillar ensures that the core business articulated in the curriculum is responsive to the overall goal of the Philippine society and economy. It employs the following core strategies:
 - Implement a relevant, responsive, and inclusive curriculum
 - Ensure every child is a reader by Grade 3
 - Ensure senior high school graduates are employable
- *I*mprovement of Learning Environment—This pillar ensures that every Filipino child is provided with a child-friendly, safe, and motivating learning environment that enables them to acquire the necessary skills envisioned in the curriculum. It employs the following core strategies:
 - Ensure child-friendly, gender-sensitive, safe, and motivating learning space for students
 - Provide appropriate technology for learning and administrative use
 - Address dental health, mental health, and overall well-being of learners

- Teachers' Upskilling and Reskilling—This pillar ensures that every learner gets quality education from competent and well-skilled learners. It employs the following core strategies:
 - Integrate, align, and harmonize training and development initiatives
 - Develop and implement fair and reasonable career development initiatives
 - Ensure welfare and well-being of teachers and other employees

Engagement of Stakeholders for Support and Collaboration—This pillar ensures that the entire society is engaged in making sure that every school gets the necessary support. It employs the following core strategies:

- Institutionalize an inclusive, multisectoral education group for better engagement
- Strengthen existing mechanism for *E* and Adopt-a-School
- Advocate and localize Sustainable Development Goals 2030

Use and Impact of TIMSS

In 2003, the Philippines participated in TIMSS for students in Grade 8 (age 13). The participation of the Philippines was carried out by the Department of Science and Technology—Science Education Institute (DOST-SEI), DepEd, and the University of the Philippines—College of Education and National Institute for Science and Mathematics Education Development.

The results of the 2003 TIMSS study, which were significantly higher than the results in TIMSS 1999, were attributed to the Grade 8 sample.² The major findings from this study were the basis for recommendations for various education stakeholders, including science teachers, educators and teacher trainers, curriculum developers, principals and supervisors, other education officials, and policymakers. Similarly, a national report discussed policy recommendations to focus on school resources, class size, curriculum reforms, licensure examinations for teachers, teacher training, teacher recruitment, student assessment, and supervision of instruction.

Based on Republic Act 10533, Section 15, Commitment to International Benchmarks and DepEd Order No. 29, s. 2017 on Policy Guidelines on System Assessment in the K to 12 Basic Education Program, the Department of Education's participation in TIMSS 2019 will provide the Department with an additional tool to measure the effectiveness of the enhanced basic education curriculum and its delivery systems. Further, the results of TIMSS will inform and support education policy decision making; identify weaknesses in the education system; and serve as benchmark to measure school effectiveness and determine the alignment of national standards with international standards.^{3,4}

The Philippines can also gain several perspectives through the TIMSS results by analyzing the information gathered in implementing reforms for quality through KITE (the acronym designating the four pillars of *S E K*, which addresses challenges in basic education by shifting the focus from access to quality).

The framework of the mathematics curriculum aims to develop critical thinking and problem solving skills. As a skills subject, mathematics provides a solid foundation for necessary concepts and life skills Filipino learners develop in basic education.

The mathematics curriculum in the K to 12 Basic Education Curriculum⁵ has two objectives: critical thinking and problem solving. These two goals are embedded in the curriculum with skills, processes, values, and attitudes of Filipino learners, which were given a great deal of consideration during its inception.

There are five content areas in the mathematics curriculum; Numbers and Number Sense, Measurement, Geometry, Patterns and Algebra, and Probability and Statistics. The mathematics curriculum aims to develop the following skills and processes: knowing and understanding, estimating, computing and solving, visualizing and modeling, representing and communicating, conjecturing, reasoning, proving and decision making, and applying and connecting. Further, it emphasizes the following attitudes and values: accuracy, creativity, objectivity, perseverance, and productivity. The curriculum encourages the use of technology aids as appropriate in the teaching of mathematics.

The education theories embodied in the mathematics curriculum are based on experiential and situated learning, reflective learning, constructivism, cooperative learning, and discovery and inquiry-based learning.

Mathematics learners must demonstrate understanding and appreciation of key concepts and principles of mathematics as applied using appropriate technology in problem solving; critical thinking; communicating; reasoning; and making connections, representations, and decisions in real life.

Key stage standards are elaborated in the following stages: K to Grade 3, Grades 4 to 6, and Grades 7 to 10.

Kindergarten to Grade 3

At the end of Grade 3, the learner demonstrates understanding and appreciation of key concepts and skills involving numbers and number sense (whole numbers up to 10,000 and the four fundamental operations including money, ordinal numbers up to 100, basic concepts of fractions); measurement (time, length, mass, capacity, area of square and rectangle); geometry (two-dimensional and three-dimensional objects, lines, symmetry, and tessellation); patterns and algebra (continuous and repeating patterns and number sentences); statistics and probability (data collection and representation in tables, pictographs and bar graphs, and outcomes).

Grades 4 to 6

At the end of Grade 6, the learner demonstrates understanding and appreciation of key concepts and skills involving numbers and number sense (whole numbers, number theory, fractions, decimals, ratio and proportion, percentages, and integers); measurement (time, speed, perimeter,

circumference and area of plane figures, volume and surface area of solid/space figures, temperature and meter reading); geometry (parallel and perpendicular lines, angles, triangles, quadrilaterals, polygons, circles, and solid figures); patterns and algebra (continuous and repeating patterns, number sentences, sequences, and simple equations); statistics and probability (bar graphs, line graphs and pie graphs, simple experiments, and experimental probability).

Grades 7 to 10

At the end of Grade 10, the learner demonstrates understanding and appreciation of key concepts and skills involving numbers and number sense (sets and real numbers); measurement (conversion of units); patterns and algebra (linear equations and inequalities in one and two variables, linear functions, systems of linear equations, and inequalities in two variables, exponents and radicals, quadratic equations, inequalities, functions, polynomials, and polynomial equations and functions); geometry (polygons, axiomatic structure of geometry, triangle congruence, inequality and similarity, and basic trigonometry); statistics and probability (measures of central tendency, variability and position; combinatorics and probability).

Exhibit 2 shows the standards for each grade level.

Exhibit 2: Grade Level Standards

Grade	Standards

Grade	Standards

The K to 12 science curriculum is anchored by the three domains: Understanding and Applying Scientific Knowledge in a Local and Global Setting; Performing Scientific Processes and Skills; and Developing and Demonstrating Scientific Attitudes and Values.⁶ The objective of the science curriculum is to integrate content and processes with appropriate consideration of contexts for learner-centered and inquiry-based instruction.

In the science curriculum, learners are expected to demonstrate understanding of basic science concepts and application of science-inquiry skills. They exhibit scientific attitudes and values to solve problems critically, innovate beneficial products, protect the environment and conserve resources, enhance the integrity and wellness of people, make informed decisions, and engage in discussions of relevant issues that involve science, technology, and environment.

Exhibit 3: Key Stage Standards in Science

Key Stage	Standards

Exhibit 4: Grade Level Standards in Science

Grade	Standards

Grade	Standards

Grade	Standards

From the start of this year, the professional development program of the Department of Education for teachers and school teachers will be fully integrated in terms of development, design, and delivery, to include the Teacher Induction Program (for new teachers), career progression programs, and special programs. All levels of governance will coordinate with the National Educators Academy of the Philippines, the training arm of the Department, for alignment of programs based on the standards and guidelines in the implementation of any professional development activities for teachers and school leaders.

The main anchor of the program for teacher professional development will be the Philippine Professional Standards for Teachers, which consists of 37 teaching areas, or strands, organized in seven domains: (1) Content Knowledge and Pedagogy, (2) Learning Environment, (3) Diversity of Learners, (4) Curriculum and Planning, (5) Assessment and Reporting, (6) Community Linkages and Professional Engagement, and (7) Personal Growth and Professional Development.⁷

DepEd emphasizes that the quality of learning is greatly influenced by the quality of teaching. Professional learning communities are important avenues for teachers to align their teaching with new education trends and practices, update their knowledge with recent teaching approaches and strategies, and revise traditional beliefs and assumptions to develop new mindsets for the profession. Teachers' continuing professional development is anchored on the framework of the School-Based Management and further elaborated in School Improvement Plans. Knowledge and discussion spaces are crucial for tackling teaching and learning issues and challenges that arise within and across the frame of pedagogy. As such, Learning Action Cells (LAC) encourage teachers to engage in collaborative learning opportunities in their respective schools and are headed by the school head or a designated LAC Leader.⁸ These school-based communities foster positive, caring, and safe spaces.

The objectives of LACs are the improvement of the teaching-learning process, which will result in improved learning outcomes; nurturing successful teachers; creating a support system for teachers to continuously improve their content and pedagogical knowledge, practice, skills, and attitudes; and providing a professional collaborative spirit among school heads, teachers, and the school community. The agenda of LACs focuses on the diversity of learners and student inclusion; content and pedagogy of the K to 12 Basic Education Program; assessment and reporting; 21st century skills and the integration of Information and Communications Technology into instruction and assessment; curriculum contextualization; and localization and indigenization.

In-Service Training (INSET) is a school-based seminar-workshop that focuses on the teaching needs of teachers to enhance their knowledge and skills, teaching methodologies, classroom

management, and professional growth and development for the improvement of learning outcomes and creation of a student-centered environment. INSET is another venue to update teachers' knowledge and mastery and boost their teaching morale as they discuss important issues within their contexts.

National assessment results are based on internal and external assessments used for different education, governance, and planning purposes—specifically for planning, monitoring, and evaluating mandates from the Department of Education. Data utilization is needed as a basis for system-level assessment to generate decision making and policy recommendations.

The Department of Education emphasizes that data utilization and generation within the agency is ultimately for the benefit of the Filipino learners. This belief is reflected in the different functions across levels of governance to align results for planning and program delivery, utilize data to provide appropriate technical assistance to schools, and prepare and adapt school-level programs for the improvement of learning outcomes and teaching-learning delivery.

The following agencies operate within the Curriculum and Instruction strand, under the Department of Education's Central Office, which supports regional, school division, and school field offices in employing national and system-level assessment results:

- The Bureau of Curriculum Development employs national and system-level assessment results to deliver a basic education curriculum that contains clear content and learning competencies in the different learning areas. Results of national assessments are used for planning and development of the curriculum.
- The Bureau of Learning Delivery develops pedagogical approaches and strategies based on the national assessment results to improve teaching quality and learning outcomes.
- The Bureau of Education Assessment is the assessment arm of the Department of Education and facilitates the implementation of national and system-level assessments to provide other curriculum and instruction bureaus with education and research-based data to improve learning outcomes.
- The Bureau of Learning Resources designs learning resources and materials for the learning needs of Filipino learners. National assessment results are employed for the development of these learning materials.
- The National Educators Academy of the Philippines—the training arm of the Department of Education—uses national assessment results for evaluation and design of training programs, school-based management practices according to their appropriateness with the Department's mandates, alignment with recent education practices and trends, and teacher hiring and qualifications for the improvement of instructional and supervisory functions of educational managers.
- Related functional offices employ national assessment results for the wider education spectrum in terms of educational planning; policy development and formulation;

program and project development and evaluation; expenditure tracking, monitoring and evaluation, pre-/in-service teacher assessment performance review and updating, bureau/office performance evaluation, and research directives and undertaking.

Special Science Elementary Schools (SSES) is an education intervention designed for children who have keen interest and exceptional abilities in science and mathematics. The activities conducted in SSES are as follows: investigatory projects and student research relative to the program; student participation in development activities, such as leadership training workshops, seminars, and conferences related to the program; professional training and development of teachers and school heads including participation in program-related seminars, conferences, and workshops; purchase of assessment materials and payment for services of psychologists and psychometricians in the screening and identification of entrants; and minor repairs and maintenance of facilities and devices, such as science model apparatuses, scientific tools, and equipment.^{9,10,11,12,13,14,15,16}

The Science, Technology, and Engineering Program is designed to strengthen science and mathematics education delivered through special science classes in selected public secondary schools nationwide. The activities involved in this program are investigatory projects; student research relative to the program, including payment for supplies, laboratory tests, rentals of equipment, spaces, and transport; student participation in development activities, such as science and mathematics competitions, training, workshops, and other related seminars and conferences; professional training and development of science and mathematics teachers and school heads, including participation in related seminars, conferences and workshops; and minor repairs and maintenance of science laboratories and existing science equipment.

The National Science and Technology Fair (NSTF) aims to promote science and technology awareness and a culture of innovation among the youth.¹⁷ The NSTF also aims to identify the most creative and innovative student researchers from junior and senior high school who represent the country in the international science research fairs.

The National Science Innovation Expo is designed to showcase products and innovation of learners. It aims to crowd-source and display science and technology innovations and solutions to everyday challenges. Furthermore, it aims at developing appropriate technologies—in particular, by taking advantage of patent information to identify suitable solutions to technical problems.

Research competitions are conducted among junior and senior high school students from both public and private schools. The first place winners in each of the categories at the regional level represent the region at the NSTF competition as approved by the national Scientific Review Committee. Competitions are clustered into three categories: Life Science; Physical Science; and Robotics, Intelligent Machines, and Science Innovation Expo.

The Metrobank-Mathematics Teachers Association of the Philippines (MTAP)-DepEd Math Challenge is conducted by the Metrobank Foundation and MTAP in cooperation with DepEd regional and school division offices. The overall objective of the competition is to ensure maximum

participation in improving quality of Mathematics Education in the Philippines. Specifically, the challenge aims to awaken greater interest in Mathematics among elementary and junior high school learners in the country; challenge them to strive for mathematical excellence; and reward mathematical talent with awards and recognition so high achievers may serve as models for the youth.¹⁸

Republic Act No. 10612 aims to strengthen the country's science and technology education by fast-tracking graduates in science, mathematics, and engineering who will teach science and mathematics in secondary schools throughout the country.

Junior Level Science Scholarships

Republic Act No. 7687, also known as the Science and Technology Scholarship Act of 1994, provides scholarships to talented and deserving students whose families' socioeconomic status does not exceed the set cutoff values of certain indicators. Qualifiers must pursue priority fields of study in the basic sciences, engineering, other applied sciences, and science and mathematics teaching.

The DOST-SEI Merit Scholarship Program, formerly known as the National Science Development Board (NSDB) or National Science Technology Authority (NSTA) Scholarship under Republic Act No. 2067, is awarded to students with high aptitude in science and mathematics who are willing to pursue careers in science and technology.

Industry-Based Projects to Improve STEM Career Engagement

The Science, Technology, Engineering, and Mathematics (STEM) Leadership Alliance brings industry and education leaders together to strengthen STEM education in the Philippines. With the theme Creating and Nurturing Innovators for Nation-Building through STEM, a recent Roundtable for Taking Action aimed to establish industry-education initiatives related to innovation, strengthen linkages to develop a pipeline of future-ready innovators and workforce, and enable participants to explore and agree on specific areas of collaboration. Representatives from education and industry shared their insights on how technology-driven and human-centered innovation and creativity contribute to inclusive national development and workforce readiness, and how government, industry, and education can ensure value and impact.

STEM education for girls is a matter of community—of people working together in empowering girls to start down the path of choosing STEM careers. By addressing the beginning of the pipeline, the #STEMpower Our Girls project invests in a future where more young girls are given opportunities to shape our world and achieve job stability in a tech-focused society.

The Department of Education is providing more opportunities for Filipino learners in far-flung areas to access education through the provision of adequate education facilities, teaching and nonteaching personnel, and learning resources. To address gaps in education, the Department of Education is prioritizing the development of the Last Mile School Project for the 2020–2021 school year.¹⁹

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