Education Consortium for the Advancement of STEM in Egypt (ECASE)

ANNUAL REPORT
August 2012 - SEPTEMBER 2013

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Acronyms

21PSTEM	21st Century Partnership for STEM Education
ACT	American College Testing (exam)
AIP	Annual Implementation Plan
AUC	American University in Cairo
BOT	Board of Trustees (school)
COP	Chief of Party
DCOP	Deputy Chief of Party
ECASE	Education Consortium for the Advancement of STEM in Egypt
EGP	Egyptian Pounds
GILO	Girls' Improved Learning Outcomes Project (USAID)
GOE	Government of Egypt
HR	Human Resources
ICT	Information and Communications Technology
MAP	Management Assessment Protocol
MEK	Misr El Kheir Egyptian NGO
M&E	Monitoring and Evaluation
MOE	Ministry of Education
MOHE	Ministry of Higher Education
NCEEE	National Center for Educational Evaluation and Examination (MOE)
PAT	Professional Academy of Teachers (MOE)
PD	Professional Development
PDI	TFI's Professional Development Institute
PMP	Performance Monitoring Plan
SCOPE	Standards-based Classroom Observation Protocol for Egypt
STEM	Science, Technology, Engineering, and Mathematics
STTA	Short Term Technical Assistance
TIES	Teaching Institute for Excellence in STEM
TFI	The Franklin Institute
TILO	Technology for Improved Learning Outcomes (USAID)
WL	World Learning
US	United States of America
USAID	United States Agency for International Development

Introduction

In August 2011, the Minister of Education and a senior MOE delegation participated in a USAID sponsored study tour to learn about STEM Education in the United States. Such exposure, although limited, was important and timely and as a result the Ministry started its first STEM School upon their return to Egypt in September of the same year. This action was based on complete conviction by the GOE, represented by the 2011 MOE delegation, that STEM schools are intended to serve as centers of excellence to provide specialized education to students who have the willingness and readiness to pursue advanced levels of science and mathematics and progress on to higher education according to their individual abilities and aptitudes – regardless of their socioeconomic status. USAID responded to the GOE's conviction by supporting the Egyptian model schools to be informed by the STEM School experience in the U.S. through a host of technical assistance activities through the ECASE project precisely one year after the 2011 visit.

While at the time GOE's actions demonstrated the MOE's commitment to strengthening science and mathematics and introducing specialized education for gifted students, the project's start in the fall of 2012 came after a change of government and a recent change of ministers which ushered in a new way of thinking within the government.

During project start-up in September 2012, instead of working with government counterparts that are totally committed to the idea of introducing STEM high schools in Egypt, ECASE had to reintroduce its mandate to the Ministry and exert efforts - the project did not plan for - to win the acceptance of the project mandate within the Ministry. In addition, ECASE was faced with resistance within the MOE by individuals who favored to define the project as a product of the old regime that should not be implemented under the newly established government.

Moreover, while the project relied heavily on the technical assistance offered by its partners to introduce the concepts and principles of STEM education to Egypt and train school principals, administrators and teachers on the new STEM system, the streets of Cairo were upset with turmoil, riots and demonstrations which resulted in a safety situation that curtailed the participation of the project's partners and cut on their valued involvement in various incidents during the past year. Yet, despite these challenges ECASE was able to consistently support the two STEM schools and provide technical assistance to school administrators, teachers, and students through Year 1 of the project.

Project Startup

The ECASE RFA, issued in January, 2012, called for two principle phases: a two months design phase and an implementation phase. While the details of the implementation phase will undoubtedly be affected by the initial design, the first phase consisted of an on-the-ground design process. This design was used to determine the nature of each project activity, while focusing on the following five system-level issues: Admissions, Schools' Specializations, and Extracurricular Activities; School Design and Preparation (infrastructural requirements, equipment, sciences and IT labs and other resources, Public Private Partnerships); Teacher

Training (training for all teachers on pedagogy and curriculum with a special focus on science and mathematics teachers and professionals; and STEM Curricula; and Student Assessment.

According to the RFA, ECASE was expected to be awarded in the summer of 2012, thus allowing at least two months for its awarded implementer to complete its two months design phase before school started in mid-September. Unfortunately, not only was the project awarded at end of August 2012, but a new girls' school was also opened in mid-September in addition to the existing 6th of October boys' school. At this point, ECASE was faced with two schools that opened for the academic year within two weeks of the project award, with no admission criteria established by the project, no curriculum ready for use, no equipment procured, and no trained teachers in either of the two schools – all while ECASE had not yet hired Cairo based staff (other than key personnel) to support the schools..

ECASE focused on training existing school professionals by bringing its technical partners at the start of the school year in mid-September to train principals, administrators and teachers in-country. It started a needs assessment study to determine what was needed in schools and started a procurement effort to bring science laboratories to the girls' school which had no lab equipment. The reality after award was that ECASE needed to adopt a crisis management mode, find ways to address immediate needs to problems that pre-dated the award and then move more intensely toward a concurrent planning stage.

Security Situation

The unstable situation in-country throughout the first year of ECASE's implementation created an impediment to the regular travel and in-country presence of technical project partners as needed to provide the necessary support and training to the schools. This situation was compounded by the US State Department issuing an ordered departure for nonessential personnel in early July 2013, a particularly unfortunate time period for the project. ECASE had plans for its technical partners to maximize the summer holidays as an opportunity for focused and intensive teacher professional development. Major training activities for current school professionals, orientations and training for new teachers were scheduled throughout the summer leading up to the start of the school year. This training was very important given the loss of training time before the start of the previous schools year due to the late project award. Unfortunately, US project staff that was in country at the time of the ordered departure had to abruptly leave the country and all planned visits were cancelled. This ordered departure resulted in the schools starting the academic year in mid-September 2013 without the planned training needed and the technical partners were not able to be on the ground to see first-hand and address technical needs. The national security situation overwhelmed ECASE's ability to more fully prepare the schools for the new school year, as planned.

Challenges within the MOE

Since the January 25th revolution in Egypt, the country has witnessed three forms of government: military rule during 2011 and part of 2012, an elected government from mid-2012 to the overthrow of the Morsi government, and a newly appointed acting government from mid-2013 through today. The successive changes in government and subsequent frequent shifts in

Ministers of Education has had a detrimental effect on ECASE. Projects of this nature are typically driven by the will of the government and the rapid change of key stakeholders caused the project to present its case and mandate every time a change in government personnel took place. ECASE took painstaking efforts, facilitated by its USAID Agreement Officer Representative (AOR), to open channels of communication within the Ministry during its startup and early implementation phases. While the Minister was convinced with the introduction of the STEM education, various old guards were questioning the viability of the idea and they turned into strong barriers to implementation that the project had to overcome. ECASE had to maneuver a narrow path and work with supporters of the project to get work done within the Ministry and provide the services to the schools. Despite this effort, challenges that were encountered include: procurement requests that had to be approved by the Ministry to allow for tax and customs exemptions were scrutinized and took longer than expected, planned study tours to senior MOE officials were determined as unnecessary (during the Morsi administration), the construction of a new school in Daqahleya were not approved until the current October and Maadi schools proved their worth. ECASE continued with its work and was able to overcome many delays through the support of its AOR who realized the problems faced by the project early on and assisted the project in finding many alternatives to proceed.

University Acceptance

The riots and demonstrations that plagued the country over the past two years affected all facets of Egyptian society. This syndrome of non-acceptance and rejection was manifested in factories, universities, on the streets of various cities and towns and among political parties. There was an expression of opinions among all strata of society. The students in the STEM schools did not escape the societal upheavals and were influenced by the events. The timing was ripe for student demonstrations, as the political upheaval came at the same time as students were faced with many new realities: a new curriculum, asked to learn in a different way, requested to spend a significant amount of time working hands on with projects – all while being expected (by themselves and their school community) to continue to be high achievers and attain the same high grades in a school that only houses students of the same caliber. This combination of factors placed a lot of pressure on the students and led them to question the new STEM curriculum given to them, the methods of teachings, and the abilities of their teachers. The transition from schools that placed the teachers as the holder of knowledge to a STEM school that puts the cultivation of student knowledge and learning at the center is a drastic change. Instead of teachers telling students what they need to learn, STEM teachers guide students to where they can find the right source for the information they need. This shift was baffling to most students and made them question the credentials of their teachers, not fully realizing that inquiry-driven project-based learning is the ultimate goal of a STEM education.

One major aspect that spurred a lot of contentious opinions among students in both the boys and girls STEM schools was the admission rules for university acceptance. The students, coming primarily from public schools, and traditionally high achievers at their preparatory schools, viewed public universities as their primary goal for university studies, with Medicine and Engineering chosen as the top prized colleges – common aspiration for high achieving Egyptian high school students. Also, the fact that these two schools are magnet schools frequented by students from governorates all over the country made students more interested in medicine and engineering colleges near their residences. Through ministerial decree, the exit exam for the STEM high school is equivalent to the Thanaweya Amma standardized test and allows the students to compete against other public school students who graduate (via the Thenaweya Amma) from other equivalent public high school degrees in Egypt, but only allows the STEM graduates a number of seats in each college commensurate to the number of STEM graduates. This Ministerial decree meant that a STEM graduate will have one seat in Mansoura University College of Medicine, for example, while the school this year has a good number of students who are residents of Mansoura - almost all of whom want to enroll in Mansoura University College of Medicine. This setup created concern amongst students in all grade levels and was most pressing for student entering their third year, and final year at the STEM school, in 2013-14. Their parents questioned their situation and their opportunities. The Ministry could not guarantee them seats in such prized colleges because of their preparatory achievements. Their parents and school Board of Trustees members explored the situation and reached the Higher Council of Universities and the Ministry of Higher Education to vouch for their children. This resulted in various student protests and demonstrations in the schools that did not only waste precious school time but rendered the presence of some of the projects technical partners ineffective because students abstained from attending classes until they were all guaranteed university seats.

ECASE was only able to diffuse the situation after agreeing with Misr El Kheir to make fifty college scholarships in local private universities, five of them abroad available for STEM school graduates this year. Also the project recently launched its college guidance efforts which will help students understand and complete the university admission system to seek high education within Egypt and in universities abroad. ECASE (working through consortium partner TIES) to try to secure places in US universities based on students' achievements and merit.

Project Activities and Tasks

The significant challenges in the four main areas of Project Startup, the Security Situation, Challenges within the MOE, and the University Acceptance had a direct impact on ECASE's Activities and Tasks as they were planned in the Year 1 Annual Implementation Plan. A short summary of ECASE achievements in Year 1 against major program activities are highlighted below. Further detail is provided in quarterly reports. Tasks that are underlined are not fully completed, tasks without an underline are fully completed in Year 1.

All project activities are part of a larger iterative process and many aspects of individual activities overlap with other activities. The summary, below, is presented according to the AIP framework for ease of monitoring and reference against the implementation plan.

Objective 1: Increase student interest, participation, and achievement in science and mathematics with a special effort geared to underrepresented groups such as girls and economically marginalized students

1.1 Implementing an admissions system that is transparent, inclusive, and criteria-based

1.1.1 Develop fair and transparent student selection criteria

TFI succeeded in developing the student selection criteria by finalizing an Admissions Framework and Selection Criteria Guidelines.

1.1.2 World Learning along with TFI presented the student selection criteria to the National Board and shared it with the MOE to approve it and set admission requirements for students entering the 2013-14 school year.

1.1.3 A 2 day training of stakeholders regarding final selection of students was conducted by TFI targeting MOE personnel responsible for applying the student selection criteria.

1.2 Promoting the STEM school within the surrounding community

1.2.1 Bi-monthly Student Town Hall meetings were conducted (and often more frequently) to listen and communicate with students to diffuse the demonstrations that students led in both schools because of college admission concerns.

1.2.2 Design BoT framework design and orientation plan was developed and meetings were held with BoT representatives but because the Maadi BoT was disbanded and the meetings of October BoT were minimal the few meetings that could be had did not contribute to the development of effective BoTs in both schools. ECASE plans to focus on this area in the coming year and take a more active role with the election of new members and to help to bring leadership into the BoTs in both schools with orientation and training to be provided by TIES. The goal is to breathe new life into these institutions so parents can actively be engaged in STEM schools.

1.2.2.1 Orient STEM School BoT and school administrators at each school on "Effective Engagement between BoT and STEM schools" Although a framework was established and orientation was provided, actual engagement of BoT leadership and personnel did not prove effective. The BoTs were either disbanded by the MOE or what engagement there was did not prove fruitful.

1.2.3 Adapt Egyptian STEM School Advokit. After a close analysis of the tool and comparing the results to the actual need on the ground, it was determined that Advokit would not be the most suitable means to advocate and promote the STEM schools. This objectives of Advokit will continue but under other the outreach activities being implemented by ECASE.

1.2.3.1 Outreach events in each school community using Advokit. Advokit was designed as a targeted tool to help provide outreach to community preparatory schools. It was determined during implementation that we needed a national approach an overarching strategy that reached far beyond individual school communities based on the fact that the two existing schools are magnet schools and are attracting students from all over the country. New tools have been devised in this year's AIP and outlined as substitutes for Advokit. World Learning and TIES will both play an important role in the roll out of such tools.

1.2.4 In partnership with MOE identify prep schools for targeted intervention. World Learning agreed with USAID that the outreach needs to be national.

1.2.5 Workshop for parents and community stakeholders on Fab Lab/Science Labs/Applied Learning Centers in each school. Led by TIES, this workshop was very successful in bringing about all stakeholders and informing them about the capabilities of the Fab Lab that will be brought to the schools through ECASE. The Science Lab at Maadi has been procured and is in operation this school year for the first time. The Applied Learning Centers are the two Cisco Networking Academies that have been planned at both schools. The training of the selected teachers took place this summer and the certificates are being issued by Cisco for both schools. During the first semester the academies should be opened.

1.2.6 Targeted field trips to relevant sites and related business, industry, and universities were supported by ECASE by providing means of transportation and sometimes paying for admission costs for students. Coupled with its PPP activities ECASE has been able to plan and implement various day trips for students in both schools that were relevant to their curriculum and capstone projects.

1.3 Preparing students for the rigors of STEM education and leadership roles

1.3.1a 6th October - Conduct baseline English proficiency tests and analyze data. World Learning took over after the British Council provided services during the first semester in order to improve services and ensure more efficient integration with the overall STEM school. The delivery of English Language Proficiency classes to students has been improved and better tracking of the students' proficiency levels have taken place. Baseline scores for English Language Proficiency have been recorded for all students in their first year starting with Grade 10 in both schools.

1.3.1b 6th October - Maintain English language proficiency training. This was delivered by the British Council during the first semester and by World Learning during the second semester and the start of the new school year.

1.3.1c 6th October – World Learning conduct end of Year evaluations of English proficiency to all students and compared to their respective baseline scores to track the development of each student.

1.3.2a Maadi – Because the British Council was commissioned to provide English Language Proficiency training to the Maadi school students, World Learning was not able to do a baseline study at the start of the first semester. Nonetheless, World Learning conducted a baseline English proficiency test and analyzed its data at the start of the second semester.

1.3.2b Maadi – World Learning maintained the delivery of English language proficiency training at the Maadi School through the British Council for the first semester.

1.3.2c Maadi – World Learning conducted an end of year evaluation of English proficiency at the Maadi School.

1.3.3 Mansoura - Conduct baseline English proficiency tests. This effort did not take place because the start of the Mansoura STEM School did not go through based on orders from the Ministry, in spite of ECASE's efforts to promote preparation for school opening. ECASE plans to conduct this baseline this year before the start of the 2013-14 school year.

Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students

2.1 Tailoring the STEM School to the surrounding community through school specializations

2.1 Mansoura – Conduct community and asset mapping for school specialization analysis framework. World Learning was not able to conduct this mapping because the school opening was delayed. World Learning plans to conduct this mapping before the school opens in September 2013.

2.1.2 Mansoura - Present results and school specialization options to National Board for endorsement. This effort was also not performed by World Learning because of the decision form the MOE to delay the opening of this school.

2.1.3 Mansoura - Integrate results into capstone design. These results were not integrated in the design of the Mansoura School Capstones and will hopefully be integrated by TIES in the next school year when the school is actually constructed.

2.2 Providing essential educational infrastructure to support experiential classroom activities (aka Procurement)

2.2.1 Conduct school preparedness exercise. TIES conducted a school preparedness exercise that assessed the needs in schools and directed ECASE's procurement efforts.

2.2.2 Inventory existing materials and equipment (6th October) and to assess needs for additional essential infrastructure for science, computer, and Fab Labs and discuss it with schools officials/MOE. World Learning worked with the school management to track the inventory of the school labs and assess the deficiencies that needed to be filled. This appeared to be a difficult operation because of the discrepancy between the actual equipment available in the school and the documentation kept in the school records. Also, the personnel responsible for the equipment were not available at all times and that made taking inventory more difficult. World Learning completed the process by the start of the 2013-14 school year.

2.2.2.1 Finalize procurement lists for MOE approval. Procurement lists have been checked by World Learning with MOE authorities who approve each item imported by

ECASE to the schools. Also local procurement is automatically inventoried by the schools' authorities to account for delivery and handing over by ECASE.

2.2.3 Procure essential infrastructure and services not provided by MOE and/or MEK. World Learning procured essential infrastructure and services not provided by MOE and/or NGO. Although the MOE and the NGO are responsible for certain items and consumables within the schools, ECASE faced the situation where various items had to be procured by ECASE in order for the students not to be delayed or to enable the school administration to do its work. Examples included procurement of raw materials and electronic supply for capstone projects, printing paper and ink for school management, projectors, printers, and digital cameras.

2.2.3.1 Procure Science Lab equipment. Equipment for a complete Science Lab was identified by TIES and procured by World Learning for the Maadi school. ECASE commissioned the services of two of the largest science laboratory equipment providers in the US in addition to a number of local vendors to provide the necessary equipment. Most of the local vendors delivered their equipment but the delay was primarily caused by the two US distributors because science lab equipment is procured by US distributors from all over the world, produced by order, and they do not keep much of the equipment in stock. The Maadi Science Lab is about 70% complete, and additional equipment will be delivered during the early part of this school year.

2.2.3.2 Procure Curriculum and Capstone materials. With technical leadership from 21PSTEM and TIES, World Learning was able to procure books for the interim Curriculum last year and Capstone materials for students in both schools as required.

2.2.3.3 Procure Fab Lab equipment. Equipment for two state of the art Fab Labs were procured by World Learning from MIT's Fab Lab Foundation. The equipment was delivered to the schools this summer and with the installation being completed in early October.

2.2.3.4 Procure National Instruments - Cairo schools. World Learning worked with the October school electronics and Capstone teacher to determine the need for each school and procure National Instruments electronics labs accordingly. The labs arrived at the schools by the start of the school year.

2.2.3.5 Provide support to school visits and extracurricular activities. World Learning provided support to school visits as explained under 1.2.6 above and extracurricular activities through its PPPs such as the Microsoft Young Women Initiative which targeted the girls' school last year.

2.2.4 Procure internet connectivity to schools based on existing infrastructure and available technology. Internet connectivity to both schools was very difficult to procure based on the existing infrastructure at each school site. Both sites are not serviced by landlines and therefore they have no existing infrastructure to connect to. ECASE had to work with local ISPs to determine the technology and availability of wireless services in the two areas to be able to provide connectivity. A big part of this connectivity also relied on the local area networks within each school site. October, because of its large number of distant buildings had to be connected with a fiber optics technology in order to not lose band strength. Maadi school buildings were connected with a typical local area network cabling.

2.2.5 Provide IT infrastructure and support in schools. Printers, projectors, servers, wiring, access points, wireless routers and other material were also procured by World Learning to the schools to sustain their activities.

2.2.6 Workshop for teachers/administrators on use of Fab Lab/Science Lab technology including curriculum design and lab maintenance and troubleshooting. This effort led by TIES was not followed through because the installation of the two Fab Labs was delayed by the ordered departure and no technical consultants were allowed to visit the country to provide the necessary technical support and ensure that the installation was done properly.

2.3 Creating sustainable and mutually-beneficial public private partnerships (PPP)

2.3.1 Solicit interest of prospective PPPs. Various PPPs were solicited by World Learning during the past year to help promote the schools and sustain its activities during the project's lifetime and beyond. Companies supporting the schools currently include: IBM, Intel, Samsung, Dow, Cisco, Microsoft, and Google. World Learning has also arranged for cost savings from the textbook publishers for the new curriculum and Fab Lab Foundation.

2.3.2 Develop school-level PPP strategic plans. ECASE sees that this step should come at a later stage when the partnerships are strengthened and become more vital and when school administrators have additional administrative support as discussed with the MOE. TIES will be training school administrators on how to manage such partnerships and how to strike new relationships. It is expected that within the second semester of the 2013-14 school year, this effort will be started.

2.3.3 Present PPPs strategic plan to National Board to support PPPs for existing STEM schools; Establish process and protocols for National Board to support. World Learning did present PPP initiatives to the National Board for approval and support but did not present or develop the final strategic plan yet. As mentioned in 2.3.2 above, TIES will develop and submit to the National Board such a plan to establish protocols and procedures to follow.

2.3.4 Stakeholders meeting to discuss confirm commitment to schools; set procedure for delivering on commitments; discuss future PPP commitments. ECASE has taken steps to secure individual corporate support and other types of PPP support for the STEM schools. A broader effort to formalize stakeholder engagement was intended to be implemented upon the final decision for the opening of the two new schools in 2014, giving ECASE a cohort of 4 schools to engage and leverage local, national and international support for a cadre of STEM schools. There was movement in March and April toward the likely opening of the new schools, perhaps even in September 2013, but that became less of a reality as the year progressed. Then the change in government cancelled this decision and only in September was there an understanding that the Mansoura and Alexandria schools will likely in 2014. The plan was to launch this cohesive effort as part of the school expansion phase of ECASE.

2.3.5 Monthly tracking of PPPs. World Learning has been tracking its progress with PPPs on a monthly basis and includes the tracking information in its quarterly reports.

2.4 Organizing extracurricular activities that complement classroom content and school specializations

2.4.1 Development of extra-curricular activities centered around PPPs, EiPIC, and Discovering Science. Such extracurricular activities were initiated with PPPs but EiPIC and Discovery Science were not developed. The revised plan was to implement these two activities in Q1/Y2 with preparations for the You Tube Video making effort starting in November. The political changes postponed that timeline. The new timeline is to implement both in Q2/Y2.

2.5 Establish Cisco Networking Academy. World Learning and TIES worked with Cisco to establish Cisco Networking Academies in both schools. Teachers were trained and the setup of the schools is awaiting issuance of certificates to trained teachers.

2.6 Establish Applied Learning Centers (FabLab). This effort was delayed due to the reasons mentioned in 2.2.6 and will be initiated in October 2013.

Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

3.1 Adapt teacher and administrator performance standards for a STEM school context

3.1.1 Develop STEM teacher selection criteria in cooperation with MOE.TFI developed STEM teachers' selection criteria in cooperation with MOE and was presented to the respective counterparts. World Learning continued to work with the MOE to have the criteria institutionalized into the process.

3.1.2 Present selection criteria to National Board for approval. The STEM teachers' selection criteria was presented to the National Board and approved.

3.1.3 Apply approved selection criteria on new teachers and teachers in existing schools. World Learning and TFI worked with the MOE and the Board to apply the approved selection criteria on new teachers and teachers in existing schools but faced the problem of not having a large enough pool of teachers to apply such criteria on. The risk faced was that if the criteria were applied as designed, the STEM schools would not find the right and appropriate teachers and would have to dismiss all of its current teachers. World Learning is working diligently to find ways to increase the pool of teacher applicants to build the process to the point that full selection criteria could be applied and at the same not hinder the hiring process.

3.2 21PSTEM worked closely with the schools' administrations and World Learning to devise observation tools to be used in classrooms.

3.2.1 Integrate profiles of exemplary STEM teachers and administrators into Specialized Teacher Performance Standards and School Management Tool. World Learning and technical partners did investigate the practicability of a comprehensive school management tool but decided to develop and implement a less costly but still effective training and curriculum management tool utilizing Google Drive. The project needed an immediate tool for these two purposes and it was determined that a comprehensive tool, if developed, would need to be developed from scratch to avoid costly licensing fees which would undermine sustainability of any tool. In addition the decision was made to focus training and teacher development time on using all the new tools and systems that had been provided to the schools through curriculum and labs. The performance standards were not addressed in this quarter did not pursue this task and need to explore its need at the current stage.

3.2.2 Approval of Tool. This will occur once the tool is developed.

3.2.3 Implementation of tool and training in each school to integrate performance standards for all teachers. This task awaits the development of the tool and its approval. Implementation will be led by TFI and 21PSTEM.

Skills Refresher in English Language

3.2.1.1 Conduct baseline English proficiency tests for 6th October teachers and analyze data. World Learning took over after the British Council provided services during the first semester in both schools. The delivery of English Language Proficiency classes to teachers has been improved and better tracking of the teachers' proficiency levels have taken place. Baseline scores for English Language Proficiency have been recorded for all teachers.

3.2.1.2 Maintain English language proficiency training for 6th October school. This was delivered by the British Council during the first semester and by World Learning during the second semester.

3.2.1.3 End of year evaluation in 6th of October. World Learning conduct end of school year evaluations of English proficiency to all teachers and compared to their respective baseline scores to track the development of each teacher.

3.2.1.4 Conduct baseline English proficiency tests for Maadi teachers and analyze data. Because the British Council was commissioned to provide English Language Proficiency training to the Maadi school teachers, World Learning was not able to do a baseline study at the start of the first semester. Nonetheless, World Learning conducted a baseline English proficiency test and analyzed its data at the start of the second semester.

3.2.1.5 Maintain English language proficiency training for Maadi school. World Learning maintained the delivery of English language proficiency training at the Maadi School teachers through the British Council.

3.2.1.6 End of year evaluation in Maadi. World Learning conducted an end of school year evaluation of English proficiency at the Maadi School.

3.2.1.7 Baseline testing of Mansoura teachers. This effort did not take place because the start of the Mansoura School did not go through based on orders from the Ministry in spite of ECASE's efforts to promote it. ECASE plans to conduct this baseline this year before the start of the 2013-14 school year.

Best Practices in STEM Pedagogy and Technology

3.2.2.1 One-week continued teacher training. TFI led a 5-day training in February 2013 for 37 teachers and the two school principals.

3.2.2.2 4-week Summer Professional Development Institute (2 two-week sessions). This effort was started this summer by TFI in mid-June. Only the first week was delivered and TFI had to leave the country because of the agitated situation on the streets. TFI was supposed to return in August to complete the training, but travel was not allowed to Egypt at that time. This 4-week PDI could not be completed.

3.2.2.3 Online discussion forums and regular communication with ECASE trainers. To provide the necessary training to the schools while US personnel are not allowed in-country, all training materials were loaded on Google Drive and teachers, administrators and principals allowed access with different levels of security. As discussed in 3.2.2.1 this effort created another channel of communication that is more convenient and available at all times. It was decided that even when in-country training is resumed, this will not cut down on the online training which is now a common source in both schools.

Creating Formative Classroom Assessments

3.2.3.1 Learning workshops on Formative Assessment. In January 2013 21PSTEM led Formative Assessment training over 4 days for 37 trainees.

3.2.3.2 Development of Learning Outcomes Training and PARLO introduction workshop. 21PSTEM completed the development of the Math and Science curriculum 1.0 before the start of this school year. . Some additional development of lesson plans are being finalized, supporting the learning outcomes, and initial training on the use of PARLO will roll out in October 2013.

3.2.3.3 PARLO software was setup based on allowing access to the site for each school by 21PSTEM. It is ready for use, but training will start in October in 2013. ECASE did not have sufficient access to teachers prior to the school opening because of the unrest on the ground and the restrictions on movement and access.

3.2.3.4 Online technical PARLO Support was provided by 21PSTEM to both schools. To start in October 2013.

3.3 Assessing progress through classroom observations

3.3.1 Classroom Observation: establishment of observation protocols. Although the protocols have been developed by 21PSTEM as part of the design of the STEM tools, ECASE is now plans to use SCOPE and MAP as the main tools after their adaptation. The protocols have not been implemented yet waiting the adaptation of the tool for STEM schools.

3.3.2 Implementation and training on observation protocols. As soon as the steps under 3.3.1 above are taken the implementation and training will take place.

3.3.3 Daily support to school leadership for school management and consistent teacher development. Jeff Mcclellan, the principal of MC2, a renowned STEM school in Cleveland who is partnering with Egypt's STEM schools through TIES, has been providing continuous technical support to leadership, management and teachers in both schools through online training in addition to one on one and group training in-country. A planned visit in September was cancelled because of safety concerns in country.

3.4 Building school principals' ability to develop and implement strategic STEM action planning frameworks

3.4.1 Creation of Student, Parent, and Teacher and Principal Handbooks. TIES developed the Student and Parent Handbook, while a "Teacher and Principal Handbook" is still under construction and is expected to be produced by TIES during the first semester of the 2013-14 school year.

3.4.1 Training in School Leadership and `Whole School' Change Management. Training in Whole School' Change Management was not delivered as planned. The school principals worked with TIES and 21PSTEM school management experts via Skype and Go To Meeting, but in-country in-depth sessions were cancelled.

3.4.1.1 Two, one-week intensive mentoring and training for principals with joint classroom observations and feedback sessions with principals and teachers. These sessions were postponed because of the need to focus on the introduction of an interim curriculum in the second semester of Year 1.

3.4.2 Action Planning workshops for principals, teachers, students for capstones. Action Planning workshops for principals, teachers, students for capstones. Action Planning workshops for principals, teachers and students for capstones was delivered by TIES in April of 2013 to prepare for the Capstone exhibition at that time.

3.4.3 Creation of Egyptian STEM Model School Design Blueprint. An Egyptian STEM Model School Design Blueprint was produced by TIES in draft form and is looked upon as a living document that needs to be updated when the new schools in Daqahleya and Alexandria or elsewhere are designed so that it is reproduced in its final form.

3.4.4 Collaborative Online Discussions and video conference for school administration team. Collaborative Online Discussions and video conference for school administration team have been led by TIES, 21PSTEM & TFI to substitute for the lack of in-country training.

3.4.5 End of School Year 3-day Retreats. End of School Year 3-day Retreat was done among partners and World Learning field and Home Office to strategize the way forward but did not happen with other parties because partners were not able to travel to Egypt during the summer.

3.5 Create a virtual STEM professional development learning platform

3.5.1 Design on virtual learning platform. An open-source virtual learning platform was established by TIES, 21PSTEM and TFI to act as a resource for all schools' professionals. A compendium of documents, manuals, curriculum, lesson plans, training material, cross walks, and references in addition to teaching material were collected and placed on Google Drive turning it into a virtual learning platform using a public free for all domain that is planned to be linked with the MOE website, and later fully developed to be a comprehensive learning management system for MOE STEM Schools. The current open-source virtual domain will continue to be updated and to contain new, updated and improved material to act as a continuous source for school professionals.

3.5.1.2 Create Action Plan for learning platform implementation, training, and sustainability. The Google Drive platform is currently being used and systems and protocols are being written as the system is formed. The platform is a living platform at this time with all needs and capabilities being determined as it is used for active curriculum and training management.

3.5.2 Updating of technical content. This is happening daily and an integral part of the virtual platform development.

3.6 Experiencing Best Practices in STEM through Interactive US Learning Tours

3.6.1 Egyptian STEM Learning Tour to U.S. was planned for senior MOE officials and delegates from Daqahleya and Alexandria to support the opening of new schools. The MOE's postponement of this study tour delayed its implementation last year and will preferably be conducted during the school spring break in collaboration with World Learning and its three partners.

Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate these model schools

4.1 Designing school-driven curricula

4.1.1 Yearly 3-day workshops with teachers and MOE participants for long term adaptation and contextualization of STEM curriculum framework and Grand Challenges. A 3-day workshops with teachers, MOE officials and university professors for the adaptation and contextualization of STEM curriculum framework and Grand Challenges was held last January and led by 21PSTEM.

4.1.2 Developing trans-disciplinary Capstone Projects (curriculum development, standardization). Led by TIES trans-disciplinary Capstone Projects (curriculum development, standardization) were prepared last year and this year before the start of the school year. The capstones were implemented in Year 1 and are being implemented in Year 2.

4.1.3 Implementation of interim curriculum (Year1 and 2 classes). Because ECASE began at the start of the school year there was not enough time to develop a complete curriculum; 21PSTEM devised and implemented an interim curriculum for Years 1 and 2 that went into full use in the 2nd semester.

4.1.4 Design of STEM curriculum 1.0 for Years 1, 2, and 3 students. 21SPTEM designed a STEM curriculum version 1.0 for Years 1, 2, and 3 and submitted its content to the MOE and gained its approval before the start of the school year. This is the curriculum currently being implemented in both schools for all years 1, 2 & 3.

4.1.4.1 21PSTEM led a curricula 1.0 presentation to National Board including a working session with MOE and counterparts to include feedback where a crosswalk between Grand Challenges and Content Standards and Scope and Sequence was conducted.

4.1.3 21PSTEM, TFI and TIES created a Capstone and PBL Handbook

4.1.4 TIES developed the Year 3 capstones for 6th of October and provided the necessary teacher training on line.

4.1.5 Review/revise existing capstones. TIES led an extensive review of the year one of the Capstones. The review led to the development of new Capstone grading and protocols and new Capstones were developed for Year 2, Capstones that are integrated into the new curriculum.

4.2 Developing comprehensive assessment instruments aligned to STEM curriculum

4.2.1 Create, administer, and analyze Concept Inventory assessments (math, science) to inform curriculum. 21PSTEM created, administered, and analyzed Concept Inventory assessments in math and science that had an important impact in informing curriculum 1.0 being implemented in the schools as of September.

4.2.2 Analysis using the Survey of Enacted Curriculum (SEC) algorithm of TA, standards, baseline assessment with international standards. An analysis using the

Survey of Enacted Curriculum (SEC) algorithm of TA, standards, baseline assessment with international standards was conducted by 21PSTEM.

4.2.3 Research and develop appropriate Egyptian college-readiness assessment system. 21PSTEM and World Learning researched and developed an appropriate Egyptian college-readiness assessment system that was endorsed by Ministerial Decree 238 issued in July 2013.

4.2.4 Recommend appropriate summative exit exam to use for impact evaluation of student learning in STEM schools. 21PSTEM, WL and the MOE chose the ACT exam as the appropriate summative exit exam to use for impact evaluation of student learning in STEM schools.

4.2.4.1 International comparison of high school exit/college entrance examinations. International comparison of high school exit/college entrance examinations was conducted by 21PSTEM

4.2.5 Creation of E-portfolio with rubrics and tools. This was explored but not implemented. An E-portfolio proto type will be developed during the 2013-14 school year by 21PSTEM and TIES.

4.3 Building the Capacity of the National STEM Board

4.3.1 Workshops with MOE and National Board to develop planning process for STEM Schools Network Plan. Various meetings and workshops with MOE and the National Board were held throughout the year. The National Board examined plans and processes for STEM Schools Network Plan where TIES, TFI and 21PSTEM attended. These meetings resulted in the planning for the two schools in Daqahleya and Alexandria.

4.3.2 Implementation of Strategic Action Planning Framework. This activity was planned by TIES, but the delay of the Daqahleya and Alexandria plans halted the development of the Strategic Action Planning as it was supposed to be informed by the process.

4.3.4 Design Egyptian STEM Schools Network Framework and network tools. This design was not developed because of what was mentioned under 4.3.2 but is expected to be developed in the 2013-14 school year when new schools planning moves forward by the MOE.

Objective 5: Support the MOE in the upgrading of science and mathematics curriculum standards, students assessment, and teacher preparation for the mainstream

5.1 Insert STEM education into the new MOE strategic plan to secure its mainstream

5.1.1 STEM school model workshop. 21PSTEM, TIES and World Learning participated in STEM school model workshops with the MOE's Policy and Strategic Planning Unit

(PSPU) to discuss STEM strategies and concepts that can be incorporated into the MOE's Strategic Plan.

5.1.2 Regular meetings with MOE. Regular meetings with MOE have taken place to transfer know how and the body of knowledge developed by ECASE in addition to what has been made available at the schools.

5.2 Collaborate with CCIMD and NCEEE in upgrading science and mathematics curriculum standers and students assessment with PAT represents

5.2.1 Training on Survey of Enacted Curriculum Workshop. TOT SEC Based Curriculum Workshop was conducted by 21PSTEM in March of 2013.

5.2.2 5-day TOT Student Assessment Workshop. Student assessment has been presented to the Ministry and approved by ministerial decree #238 dated July 2013. The understanding of this decree and its implementation has been debated with the students and the MOE and a memorandum is expected to be issued within the first semester of the 2013-14 school year to explain its implementation. Upon the issuance of this explanatory memorandum a workshop may be conducted to further put the idea into practical use. 21PSTEM, TIES and World Learning will lead this process.

QUARTERLY PROGRESS REPORT
JULY – SEPTEMBER 2013

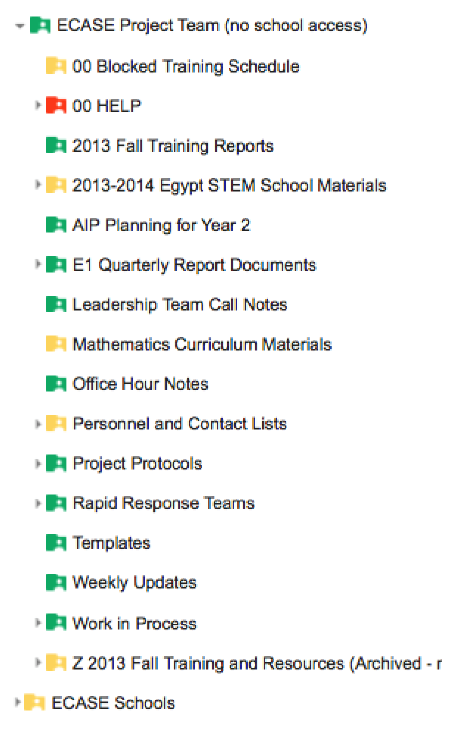
Education Consortium
for the Advancement of STEM in Egypt
(ECASE)

Summary of Fourth Quarter activities

During the fourth quarter of the ECASE project's first year, Egypt experienced major events that continue to shape its political transition and undergo a dramatic political and socio-economic upheaval. Continuous nationwide protests civil unrest and social instability marked this period of time. ECASE had to alter its entire implementation plan and schedule.

Work with new schools was put on hold for several months due to a variety of factors including safety, political instability, and lack of support from some in the MOE. However this changed with the end of the Morsi administration and with the new Minister of Education. Very quickly the MOE became very supportive of the project and by the end of September had confirmed their support for two new STEM schools with an anticipated opening in September 2014. There was some discussion about a third school in Assuit but those plans have proven to be further behind.

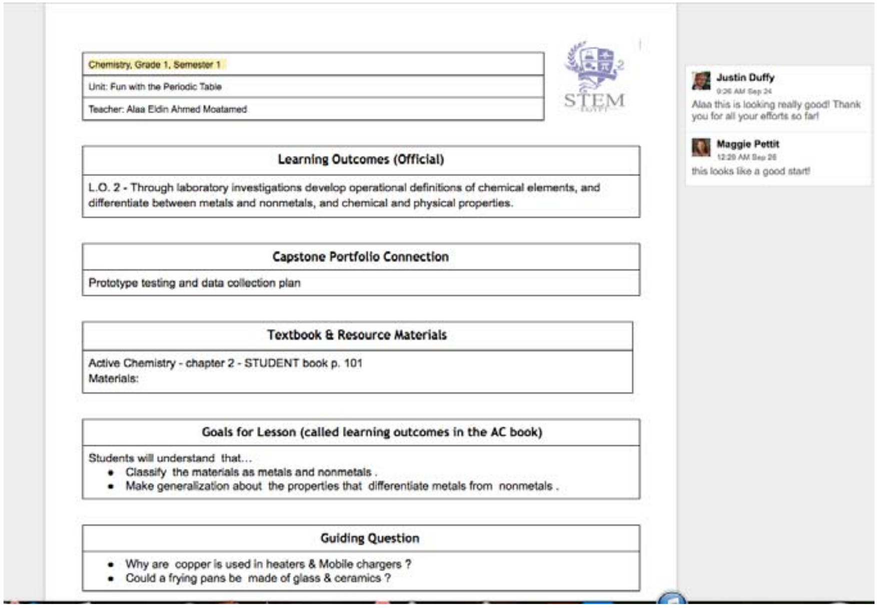
Highlights of the ECASE team's activity during the quarter include;



- ***Virtual Technology (Google Drive***) – Because of the inability to travel to Egypt, the spent much of the past quarter building up its virtual capacity and implementing an extensive training process virtually. Massive demonstrations throughout Egypt on June 30, 2013 resulted in the early evacuation of US staff and consultants from the country, stopping any in person professional development and support activities. In response to these changing circumstances the team created a Rapid Response team to provide virtual professional development to teachers and principals. Ultimately, broad and quick adoption of GoToMeeting (web conferencing) and Google Drive (content repository) were decided on to support implementation of the curriculum, ongoing professional development, initiation of the capstone process, and training on PARLO tracker for grading. These items were critical to the teachers who were starting school on September 21, 2013 needing to use a new curriculum without any in-person training and with only 4 days of a planned two week intensive training session. Between the end of August 2013 and the start of school, the ECASE team was able to create a virtual system to deliver nearly 100 training sessions to enable teacher readiness at the start of school. Work will continue virtually and the project will continue leverage these unforeseen opportunities, such as access to a cadre of STEM professionals in the US who would not have been able to provide support in person in Egypt. Additionally, this virtual environment support has fostered greater integration across the team and enabled greater consistency in the provision of training by allowing any team member to participate in any session.

In addition to the adoption of virtual technologies, the team also shifted the curriculum management activities to the Google Drive environment. Templates and scripts were created to extract previously generated content, including units and learning outcomes from CurricuPlan to enable access by teachers to the curriculum in a collaborative environment. Further, the Google Drive tool was used to generate lesson plan templates associated with all learning outcomes. Features for commenting within Google Drive enable review and feedback by a variety of STEM professionals.

- ***Curriculum*** **–** It is worth to mention that the MOE has approved the full Science curriculum and the first semester of the Math curriculum. 21PSTEM has been working with the teachers to assure fidelity of implementation of the curriculum and the use of PARLO Tracker for grading. TIES has been supporting the implementation of Capstones. TFI has been working with new teachers on STEM pedagogy and best practices, while also working with the Humanities teachers to create a curriculum in support of a STEM school. All work has been handled virtually through the use of Google Drive and GoToMeeting web conferencing.



  In further preparation for the semester, 21PSTEM has been working to solidify options for assessment, aligning to the Ministerial decree. Specific focus has been given to identifying and implementing a college readiness exam, likely a translated version of the ACT. 21PSTEM will also continue to work with the MOE in the development of the math and science end-of-course exams. Both items will be a primary focus in the next quarter (Oct – Dec 2013). **(Annex 1)**

- ***Fab Lab Status -*** The Fab Lab equipment arrived Cairo during the previous quarter (Q3). Installations were to be completed before the start of the school year but the travel ban and lack of security forced this to be postponed. Given the extensive delay in travel allowability to Egypt World Learning established a strong relationship with Fab Lab Cairo who will become the primary installer of Fab Lab equipment starting in October.

In parallel, it was determined that a focus on the curriculum should take precedence at the start of school and Fab Lab training should occur post curriculum implementation. Looking to more closely integrate Capstones with Fab Lab and curriculum:

- The Fab Lab competencies were aligned to Capstone Learning Outcomes
- An expert group was convened to further develop a training framework for Fab Lab
- The Fab Lab Training/Professional Development framework was finalized and adaptations were started to support both remote and in person training

Early in the next quarter minor renovations are expected to be completed at the Maadi school and installation is expected to be completed at both schools. In addition to Fab Lab Egypt, there will be remote support from Fab Foundation, Shopbot, and Fab Lab Barcelona, which will complete both installations. It is expected that training will begin with teachers in November. Fab Lab Barcelona will be available to support local contextual training, while TIES staff will remotely conduct curricular related training based on student training modules. These modules and their associated implementation strategy will be completed early in Q4.

- ***Professional Development –*** A new plan was created to work with Egyptian teachers via web conferencing. Starting August 26, 2013 the focus has been on two cohorts of teachers. The first group is the new teachers hired for both Maadi and 6th of October schools during the summer. They have been given an accelerated set of PD sessions to try to build teacher capacity for this upcoming school year. The second group of teachers that TFI has been working with intensely is the Humanities teachers from both schools. The focus here has been on documenting the curriculum for the English, Foreign Language, Arabic and Social Studies teachers and fitting the information into a template that can format lesson plans based upon learning outcomes.

  Web conferences for both new teachers and humanities teachers were held three or four times a week starting in late August and culminating before the start of school, with sessions lasting one to four hours. Due to the time difference and the availability of the TFI team, conferences usually occurred between 6am to 8am in the morning Eastern Standard Time. After September 21, 2013, the team moved to adopt the concept of offering virtual “office hours” with teachers to brainstorm potential classroom activities and to provide feedback on pedagogical methods. Moving forward, TFI will continue to use web conferencing for office hours and instruction.

- ***English Proficiency –*** There was urgent demand to run an intensive summer English classes for both teachers and students in Ma’adi and October Schools. This demand was claimed by teachers and students who always expressed their inconvenience with having ELP courses during the school year due to their work and study load. Additionally, summer intensive programmingwere seen as a way to better prepare both teachers and students for the rigors of study in a very different context.

As students begin their studies at the STEM high schools, they experience an environment in direct contrast to the Arabic-language-delivered highly teacher-centered environment found in most Egyptian preparatory schools. STEM courses are delivered in English, and teachers will now evaluate students on their individual initiative, ability to collaborate with others, their ability to comprehend theories and apply them to practical real-life activities, and on their understanding of the world around them. Meeting these demands in English provides a tremendous challenge for STEM school students. All new students joined the course.

Teachers also need support in developing their English skills, so that they feel confident delivering instruction in English, and so that they can more easily engage in STEM-school Professional Development Institute trainings. The curriculum for the Summer Intensive addressed competencies needed for negotiating meaning of academic texts and discussions, effectively interacting with classmates and teachers in English, and comprehending and responding to English-delivered STEM content.

Summer classes were planned to run for 3 intensive weeks for both teachers and students in each schools. However, the plan was subjected to many changes due to the uncertain political situation in Egypt. Eventually, the Teachers program ran on time for 3 weeks as scheduled, while the Students program ran only for two weeks after many suspensions and delays. **(Annex B)**

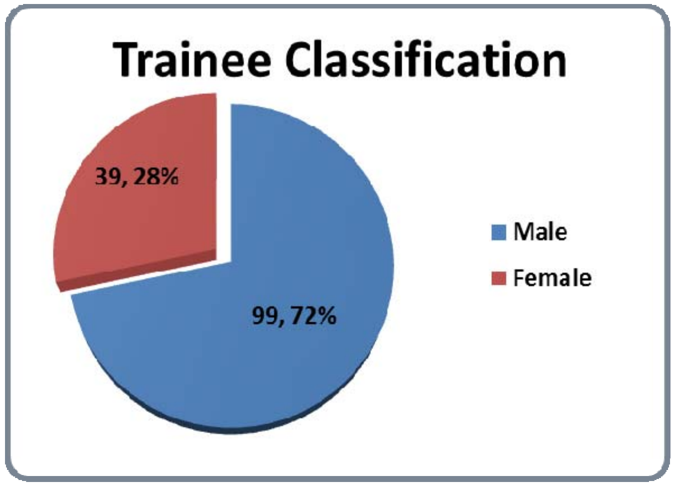
- ***IBM Visit -*** Noteworthy, the ***visit of the IBM*** representatives to the 6th of October Festival has raised IBM's awareness on STEM Schools. Ms. Mona Arishi showed a lot of enthusiasm and willingness to help STEM Schools. On Sep 9, 2013, a group of 49 students (26 females, 23 males) visited the IBM Company and presented their projects. A Documentary film was played for the students showing the IBM activities in the field of Information Technology, its 100 year celebration of the IBM opining, in addition to speeches held by Mr. Amr Talaat, CGM, Dr. Hesham el Shishny, IBM Master Inventor, and Ms. Mona Arish, about the role of the company as a leading community player and the company's contributions into teaching science methods.

The IBM visit was a fruitful first step that gives the student a chance to listen and discuss topics they are interested in, also, it is increasing their self-confidence and giving them an idea about the work community and how it looks like.

Ms. Mona Arishi showed willingness to provide the schools with of the suite of IBM educational applications as appropriate to the schools. Mr. Ahmed Kawanna, SLB Recruiting Manager, raised the issue of how would SLB take part in supporting

STEM schools and the need to assign a meeting with IBM representatives to discuss and negotiate this issue with them.

- ***Training –*** ECASE continues to compile all training data from the beginning of the project up to date. Despite the obstacles facing the project represented in massive demonstrations throughout Egypt on June 30, 2013 that led to early evacuation of foreigner staff from the country, the team created a Rapid Response team to provide virtual professional development to teachers and principals through web sessions. These sessions delivered to in Ma'adi and October schools teachers and classified to;



1. Discipline training (across grades)
2. Capstones training
3. New Teacher Pedagogy
4. PARLO
5. Humanities

The total number of trainees up to date are 138, 99 male and 39 female.

Activities leading towards accomplishment of Program objectives

Project Management

Due to the unrest and political changes in Egypt, and because schools will continue to be functional and of utmost importance to the future of the country and economy, the team was obligated to reconsider options for implementing STEM programming within the schools. During a retreat on August 5, 6 2013, the full leadership team met to discuss options moving forward and to refine plans to enable successful implementation of the work. During the retreat, the team accomplished the following:

- Created a deeper understanding and awareness of the current political situation in Egypt
- Strategized priorities needing approval from the Ministry of Education to enable on-going advancement of the work (e.g. decrees, curriculum, support of new schools)
- Reviewed progress and level of implementation of STEM within the schools, indicating progress is as expected
- Defined priorities and requirements for a virtual interface to remain engaged with the schools

- Discussed, tested, and implemented a plan to provide more detailed planning and integration across the team through an Activity Planning process to enable build out of the Year 2 AIP with clear schedules, roles and responsibilities, assumptions, and risks
- Reviewed and refined priority work plans for Capstones, Extracurriculars, Professional Development, Curriculum, and College Readiness Assessments
- Developed a Rapid Response protocol to handle immediate needs in order to keep critical team members full engaged in important work and to avoid derailing priorities when unplanned issues need addressed
- Agreed to implement a project dashboard and collaborative environment for team collaboration

Activities such as curriculum creation, training, pedagogical professional development, and coaching had to be reconsidered from an implementation standpoint. In an effort to adhere as closely as possible to the AIP, the team made a conscious choice to further investigate, select, and implement a virtual training platform to deliver of as much of the originally planned content as possible. The Rapid Response team evaluated various virtual training options, including web conferencing software and high definition hardware, based on performance, reliability, ease of implementation, and cost. Options for high definition hardware, such as Polycom, fell short in the ability to share important content, such as presentations, documents, and videos. At this time, the team has selected and is using GoToMeeting as a virtual training platform. This web conferencing tool offers greater stability, quality, and reliability over free tools such as Skype and Google Hangout, which were used intermittently in the past. To further advance capability, all US sites and schools have or are obtaining high-end web cameras to allow a good visual interface within the GoToMeeting environment.

Ultimately, the use of GoToMeeting has proven to be successful by providing the ability to offer nearly 100 virtual training sessions from August 28 – September 30, 2013. At any one time, training sessions have included participants from more than 8 international cities and a greater number of locations, with participants from multiple locations in the states of Ohio, Maine, Pennsylvania, Massachusetts and Washington, DC. The web conferencing environment has offered the project many unanticipated benefits, including:

- Cost savings on travel
- Greater integration and planning for scheduled events
- Centralization and detailed communication about training opportunities
- Broader access across the team to join various training sessions and to hear information first hand
- Access to a larger cadre of STEM professionals who would have been unable to travel
- Flexibility in the overall schedule
- Greater touch points for enhanced retention of content
- Ability for stakeholders to experience and “drop in” on events when available

The combined use of GoToMeeting with an online file sharing platform, Google Drive, has further enhanced the project, providing a unique case study on the use of virtual technology.

While several options for content management exist and had been offered in the past on this project, the recent selection of Google Drive, a platform already in use at the schools, combined with the need for immediate virtual access to the ECASE team by the schools, has exponentially increased the use of a centralized repository.

Currently, this repository is available to all teachers and staff at the schools, and all partner organizations and contractors supporting the project. The site contains content assigned with appropriate "permissions" to assure security of the content. While attempting an early launch of an open and transparent system, it quickly became obvious that the content was not secure in such a system. The entire structure and permissions were reset the weekend before school started. The reset allows permission to be established through the use of groups. Teacher groups are managed by the schools and project staff is managed within Google Groups. This feature provides added security and offers the schools more control to turn access on and off. The groups are assigned permission to view or edit certain content elements. As an example, the project team and teachers can see the full curriculum, but only discipline specific teams have access to review and modify lesson plans. During this process, templates for lesson plan creation were created and automatically assigned to learning outcomes in the curriculum. This tool within Google Drive established the framework for over 100 lessons plans that can be reviewed across schools and by the project team.

Specific next steps associated with the project tasks are further described in the following sections.

Prof. Mahmoud Abo El-Nasr, Minister of Education, has visited the Maadi and the October Schools on the 25th and 26th of September respectively. The main purposes of these visits were to check on the management compliance with the rules and regulations and to monitor the performance of the teachers and the students. The tour started by passing by the classrooms and attending some of the sessions held, in order to check on the level of knowledge and education gained by the students from the newly adopted integrated- STEM system.

As well, the minister paid great attention in observing the tools and equipment in the classes and labs, and ended his tour by checking on the capstone projects which most captured his attention. The capstone projects have given him a better view of the expected outcomes from acquiring the STEM education.

It is worth to mention that the minister was impressed by the effective managerial and administrative performances of the school, in addition to the high-quality implementation of the STEM education. The minister has confirmed that the level of performance of both schools confirms their successful achievement towards sustainability. Last but not least, Prof. Abo El-

Nasr showed appreciation and announced that the ministry will establish 2 STEM schools in Mansoura and Alexandria.

Project Activities

This section summarizes key accomplishments in the fourth quarter against the AIP for each objective area. All project activities are part of a larger iterative process and many aspects of individual activities overlap with other activities. The summary, below, is presented according to the AIP framework for ease of monitoring and reference against the implementation plan.

Objective 1: Increase student interest, participation, and achievement in science and mathematics with a special effort to underrepresented groups such as girls and economically marginalized students.

During this quarter, no further work was done to refine the specifics for implementing a **student admission system to the STEM school that is transparent, inclusive, and criteria-based (Activity 1.1)**. The proposed framework (Activity 1.1.1) for the student admissions process was sent to the MOE. As stated last quarter, a meeting with MOE representatives was held on June 19, 2013, to discuss the tools and tests. MOE agreed to review admission tool which are used in order to achieve accurate selection in the future. During next year WL will suggest to delegate the selection process to the Board.

In an effort to promote the STEM school within the surrounding community (Activity 1.2), no further work has been done to work with the Board of Trustees (BOT), as the BOTs were disbanded, school was not in session, the time period included a month long Ramadan holiday, and travel was restricted. While TIES created a training documentation package in Quarter 3 in preparation for meetings with BOTs (Activity 1.2.2) from both Ma'adi and 6th of October, no further implementation has occurred or has been feasible. As BOTs are reformalized during the school year, TIES is prepared to offer the training package established in Quarter 3.

In addition, the project team agreed in Quarter 3 to put the Advokit activity on hold. While it is feasible to provide a framework for this Advokit, full advocacy is limited due to political unrest and limited travel to remote locations for potential new schools. The TIES team originally planned to hold workshops to tailor a STEM School Advokit to Egyptian needs (Activity 1.2.3). An Advokit acts as a playbook for regional grassroots advocacy stakeholders – including and enabling outreach objectives/actions, goals, strategies, key messages, and consistency of voice. The path forward for this activity needs to be determined. To be effective at raising funds, the schools must depend on stable and focused community development. With the instability of the Egyptian government, community financial investment is highly unlikely. Moreover, the Advokit requires a stable intermediary who will remain beyond the grant period. The likely NGO for this has not completed their paperwork to finalize establishment of their NGO and the appropriate tax status. As previously stated, and due to various dynamics, this activity could take a couple of years to realize. In the short term, TIES will convene the new World Learning staff for public-private-partnerships and review the efficacy of Advokit and likely will focus on the creation of a case statement, one that would support an Advokit, but also provide direct support for building public-private partnerships.

Additionally, to provide further support to the schools, TIES has agreed with World Learning to provide support for creation of a STEM college guidance program. TIES will work with a College Guidance professional hired by World Learning to provide guidance and procedures to enable a focus on international opportunities by the students. TIES will work with World Learning on this effort and will provide access to key experts in this area.

Since this quarter was summer holiday (July-September), no field trips were scheduled in this quarter.

In an effort to prepare students for the rigors of STEM education and leadership roles (Activity 1.3), Two English baseline tests were conducted for new grade 10 students; one for 150 male students in October school and another one for 120 female students in Ma'adi school. The test date was August 25th, the date has been scheduled in co-ordination with the Ministry of Education, MOE. The students were notified about the test by the MOE as well. The baseline tests were administered and graded by World Learning ECASE English Teachers. On the test day, students were divided alphabetically into seven groups in each of October and Ma'adi schools. Almost all the students showed up on the test day. See the appendix for students name lists and grades. These results will serve as a baseline for the project.

English Proficiency Annex B contains results.

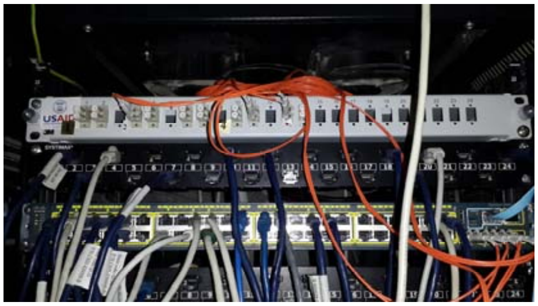
Objective 2: Strengthen the STEM school local initiative through developing an effective model of specialized high school focusing on science and math for gifted students

During Q3, work to **tailor the STEM school to the surrounding community through school specializations (Activity 2.1)** was put on hold in the vicinity of Mansoura and other locations. As of the end of the 4th quarter, the Ministry of Education has approved 2 new schools in Egypt for the 2014-2015 school year. TIES will be working with World Learning to review and revise the existing STEM school Design Manual according to the parameters and constraints that exist for the new schools. The design process will include community involvement in the design, as well as specifying the needs of the school, including curriculum, professional development, teacher and student selection, and equipment/labs/book procurement lists. The Design Process will be enabled through a series of Design Studios and in collaboration with the entire ECASE project team. With an anticipated roll-out of these new schools next year, a focus on STEM School Design will become a major focus of the work of the team in the next quarter.

During this quarter some of the remaining science lab equipment were delivered to Ma'adi School (about 5% meaning that the total Science lab equipment delivered are 65%), moreover Science, English, Earthcomm and Math books were delivered to both schools. All the requested lab furniture (shelves, half cabinet, and drawers) were delivered and installed in October school adding to some electrical infrastructure. Cisco switches

were delivered to both Ma'adi and October. Also 14 Desktops were delivered (7 per each school) for Fab Lab. Moreover 4 webcams were procured and delivered to both schools for the on-line training purpose (2 per each school). Finally electronic items (RFID) were procured and delivered to October school for Capstone projects purpose.

In further support to provide IT infrastructure to both Ma'adi and October Schools during this quarter the following activities were done;



- October School fiber optics and UTP network tender was issued, awarded, finished and received.
- Cisco Switches were delivered and installed in both schools.
- " Fortigate Appliance" delivered to both schools
- Two webcams were installed and tested for each school for on-line training purpose.

During Q4, TIES and World Learning have continued to collaborate to create sustainable and mutually-beneficial Public Private Partnerships (PPP) (Activity 2.3). TIES has continued to talk with various stakeholders and has worked with World Learning's new staff to refine a database of PPP opportunities. TIES has also engaged another senior level consultant to work on the PPP initiative by creating and managing a case statement for the work and for the schools. This work will support both PPPs and advocacy within the surrounding communities. The following are the steps taken during this quarter;

- Two visits were arranged to Unilever and Shell companies. The visit to Unilever was on 21/7 in Alexandria and Shell on 26/8. The visit to Shell was promising. There are several common points of interest. Shell could support innovative ideas in the areas of energy efficiency, road safety and recycling. Also, Shell Eco-marathon teams could help our students in designing, building and testing energy efficient vehicles. Capstone projects could benefit greatly from these developing areas of interest.

- IBM Day: a day hosted by IBM where senior management from IBM addressed the STEM students. STEM students –boys and girls schools- presented their projects to the attendees. IBM people and Schlumberger were impressed with the projects and want to cooperate to sustain the STEM schools projects. IBM visit was a fruitful step on the way of giving the students an insight into the future of computer science.

- Culturama visits: arrange visits to students of girls school to visit the culturama and get more exposure on how technology could help preserve our heritage.

- Intel initiative: meeting with Intel management to explore opportunities for collaboration benefiting the schools as well as the students. agree on:

- Intel Entrepreneur for Grade 3 students in order to help them shape their CAPSTONE projects and give them an idea on how to turn these projects into successful projects
- Intel Technology and Community for Grade 1 students in order to help them shape their Capstone projects

- ISEF: work on having students participate with their CAPSTONE projects in the coming ISEF –Intel Science and Engineering Fair-. Steps involve having someone to inform them about ISEF competition and how to proceed

- LINKdotNET initiative: meeting with LINKdotNET management to inform them about opportunities to cooperate with STEM schools. they are waiting for more concrete information from our side on how can they help sustain STEM schools:
  - Support a computer lab
  - Sponsor students or project

- PepsiCo initiative: meeting with PepsiCo management to inform them about opportunities to cooperate with STEM schools.
  - Exposure and challenge for students –visiting the factory and taking challenging problems to solve such as water and energy usage optimization
  - Empowerment of women
  - Job shadowing –summer

During Q4, TFI continued planning the development of **extracurricular activities that complement classroom content and school specializations (Activity 2.4).** Due to the inability to travel to the country or plan for a specific launch date of programs, a plan was generated for the next quarter, assuming a launch of three critical extracurricular programs by the end of the first semester of school. As previously described, these programs include:

- Student-created YouTube content – videos to support overall community outreach and visibility to prep schools
- eSTEM Learning Videos / Discovering Science live science demonstrations – to allow students to teach STEM
- EiPIC – program to provide real-world concept management for new ideas, including patenting and refinement

Extracurricular Intellectual Property Innovation Center

EiPIC || An EiPIC Story || The Program || Patent Process & IP || FAQ || Egypt STEM Scholars

Welcome to the Extracurricular Intellectual Property Innovation Center (EiPIC)!

EiPIC invites young students who have innovative and novel ideas to learn from professionals about how to go from an idea to praxis. At EiPIC, students will learn about the importance of intellectual property and the process of acquiring a patent for an idea. Students will be able to learn from scientists who have gone through the patenting process as well as professionals in intellectual property law. Through this initiative, The Franklin Institute aims to aid students in making novel ideas a reality.

These programs will serve to:

- Engage students in informal science and technology learning
- Explore STEM topics in a self-directed manner
- Develop an internet library of STEM learning videos created by students
- Understand of the role demonstrations and hands-on learning play in engaging others in
- STEM topics
  Increase student self-confidence and awareness about opportunities for careers in STEM

Currently, options for launching extracurricular programs virtually in advance of the end of the first semester are being evaluated. In the near term, TFI hopes to have the opportunity to launch EiPIC (http://www.fi.edu/EiPIC) by identifying up to 5 days of student time for the first portion of the program implementation (workshops and panels with experts). In order to launch the program, TFI will require the support of the field office identifying local scientists and engineers to support the program.

Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

In efforts to **adapt teacher and administrator performance standards for the STEM school context (Activity 3.1) and assess progress through classroom observations (Activity 3.3)**, 21PSTEM created ECASE Observation Protocol and Using the ECASE Observation Protocol documents in Q3. As of the spring of this year, a teacher classroom evaluation instrument and protocol for using the instrument was developed by 21PSTEM. As of the end of the 4th Quarter, 21PSTEM developed a “Walk through” protocol.   21PSTEM will update the tool and guidelines and will consider options for virtual support or will conduct on-site visits depending on travel feasibility.

Once it became clear that the current political instability in Egypt would not allow a trip at the end of August 2013, TFI was forced to reconsider options for the remaining activities planned as part of the Professional Development Institute, originally planned for mid-August. To continue its work in building teacher capacity to effectively implement STEM curriculum in the classroom and offering best Practices in STEM Pedagogy and Technology, WL continue the English Proficiency courses.

In July 11th and July 25th an English baseline test was scheduled for all teachers in October and Ma’adi current teachers and potential ones. The dates were scheduled in co-ordination with the Ministry of Education. As for the current teachers, 23 current teachers in October school and 19 current teachers in Ma’adi school, total of 42 teachers in both schools. As for the potential teachers who were still in the hiring process, 19 teachers were requested to take the baseline test. Before the test was conducted, a full description of the test and general guidelines and tips along with a complete sample test was e-mailed to all examinees; current and new. The purpose was to orient all teachers with the exam sections, procedures, and guiding techniques and ensure better performance at the exam. English Proficiency Annex B contains results.

With respect to the PARLO Tracker software (Task 3.2.3), 21PSTEM is utilizing this tool for teachers to document student progression in achieving various learning outcomes for a particular course. The teachers at 6th October and Ma’adi were provided technical training over three days in September 2013. Preliminary work was done to populate the system with training data so the teachers would have a basis on which to practice the various functions of Tracker. Initial data files for “live data” were started in late September 2013 and continue to be populated. Office Hours via GoToMeeting were held in late September 2013 to allow for follow up one-on-one training and Q&A with Egyptian teachers.

During the next quarter, 21PSTEM staff will work with World Learning and School Administration to compile the “live” student and course data to be loaded into the PARLO Tracker system. These data sets will be loaded into the backend on a rolling basis by discipline as the Learning Outcomes are finalized for each subject area. Teachers will continue to have access to their training data on the system and will be moved over to the “live” system as their data becomes available. Additional Office Hours will be held from mid-October until the end of December 2013 on a weekly basis (more if needed) to provide additional assistance to teachers utilizing the Tracker system.   The technical team will work with World Learning and School Administration to compile the 2nd Semester Data that will be loaded through the back end into the system prior to the end of December 2013. Additional training for teachers will be set up in December to train teachers on more advanced system functions as well as sharing information with students. It is the understanding of 21PSTEM representatives that Tracker will be rolled out to the students the second semester of the 2013-2014 academic year.

Further, due to the school break, Ramadan, and inability to travel, little work was accomplished with respect to **building school principals’ ability to develop and implement strategic STEM**

action planning frameworks (Activity 3.4). When feasible, informal dialogues occurred with the principal of 6th of October, but the decision on a new principal for Ma'adi School was only realized at the end of September. At that time, a focus on implementation of the curriculum was a priority and principal involvement in this effort took precedence over specific leadership training. At the end of September 2013, a decision was made for TIES to send staff to provide overall technical assistance to the principals on the ground. This trip is expected in early October and will be used to formulate a plan for ongoing action planning and support of the school leadership.

The **creation of an Egyptian STEM Model School Design Blueprint (Activity 3.4.3)** continues to evolve. Due to the constant changes in vision for the schools because of the political changes in leadership within the Ministry of Education, TIES focused staff time on activities of more pressing concern (e.g. web conferencing). The Blueprint will continue to evolve over the next quarter and will be part of the overall planning for the new schools.

TIES was scheduled to support **end of school year 3-day retreats (Activity 3.4.5).** Because of the overall focus on Capstones and their grading, it was determined it would be more feasible to conduct a retreat at the beginning of school and as part of the overall training on curriculum and capstones. However, due to the demands and needs for curriculum implementation and training and the inability to travel, this activity did not happen and likely will not occur until after the first semester. This activity as highly desirable.

The work to support **creation of a virtual STEM professional learning platform (Activity 3.5)** has been dictated by circumstance. Ultimately, the adoption of a large system platform for use by the schools is premature within the timing of this project. More pressing and basic needs exist on the ground, including the creation of a student/school management system and an integrated curriculum management system. At this time, due to the use of Google Drive by the schools and because of the integration of the curriculum to that platform, it is proposed that a sustainable school management and curriculum management system be created in collaboration with the schools. A STEM learning platform can only be reconsidered once a technical backbone is in place.

Finally, the ECASE team had worked in previous Quarters to provide opportunities for Egyptians to **experience best practices in STEM through Interactive US Study Tours (Activity 3.6)**. Visits were put on hold pending approval by the ministry of new schools. It is anticipated that a best practice STEM Tour will be part of the early design work of the newly approved STEM schools.

Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate STEM model schools.

The primary focus of the last quarter has been to finalize, obtain approval, and implement training to support the STEM curriculum 1.0 at both schools. 21PSTEM had several meetings throughout Q4 to coordinate the **design of (STEM) school-driven curricula (Activity 4.1).** With the exception of some very fine-tuning and lesson-plan writing, the science curriculum is complete and has been approved by the Ministry of Education. Both semesters of all courses are designed with learning outcomes developed; however, 21PSTEM will make modifications to the Grade 2 semester 2 Physics course in order to strengthen the mechanics and allow for greater integration of mathematics.

A team from 21PSTEM had originally planned to return to Cairo in late June 2013 to meet with the new Grade 3 teachers from the universities to work specifically and collaboratively with them on the Grade 3 course designs. Because this was not possible, several discipline specialists were hired to complete the design of these courses without the university staff. Further, these specialists were brought in to provide specific training on the curriculum.

Finalization of the mathematics curriculum has been more challenging due to a variety of circumstances: concern about cultural contextualization, pending Ministry approval of the recommended textbooks, challenges in the ability to effectively communicate the scope, sequence and depth of the mathematics curriculum in terms that the Ministry officials could understand, and finally circumstances that prevented the 21PSTEM staff to be able to meet deadlines in the development process. Given these challenges, the Ministry granted approval for the first semester for all three grade levels and has made additional requests for the rest of the year. During the early part of the next quarter 21PSTEM will focus on these requests and obtaining approval for the second semester mathematics curriculum.

In both cases, for math and science, a variety of curriculum materials have been procured through World Learning. Schools continue to wait for final books and lab kits, but are working with preliminary or online resources until the full set of procured materials arrive in the schools. It is expected that all procured books, kits, and supplies for the first semester will arrive early in the next quarter.

In addition, on September 1, 2013, an additional challenge was presented: the actual length of the first semester was reduced from 18 to 14 weeks. While teachers have been asked to implement the curriculum as designed, 21PSTEM will work with them to understand pacing and adjustment opportunities to reduce the curriculum schedule by re-blocking of the semester. To support this activity as well as to ensure fidelity of implementation, 21PSTEM is sending one staff member to Cairo to oversee curriculum implementation and to assure a deep understanding and ownership of the curriculum by teachers. The on-the-ground support will last 7 weeks in the earliest part of the next quarter.

In addition to the finalization and approval of curriculum, the team put a concentrated effort toward enabling a system to offer training virtually to assure understanding, adoption, and implementation of the STEM curriculum. Ultimately, the team transitioned from the originally conceived plan for on the ground development of lesson plans with the teachers to a virtual interface. This effort was supported by the previously discussed technology for web conferencing (GoToMeeting) and content management (Google Drive).

In August 2013, it was decided that use of the CurricuPlan curriculum development and management software for the actual implementation and management of the curriculum would not be feasible due to the on-going costs to the schools and other shortcomings. In response, and because the lead-time was short, all curriculum content was shifted from CurricuPlan to Google

Drive. To enable this, 21PSTEM worked with World Learning to create scripts to allow for the extraction of CurricuPlan data to a master spreadsheet that could be maintained in Google Drive. Additionally, scripts were established to create units, lesson plans, and capstone files to be aligned to the learning outcomes. More than 100 lesson plan templates were created for use by the teachers in this process.

The shift to Google Drive enabled two major improvements in the curriculum: 1) linking all instructional and assessment design components through learning outcomes, and 2) providing a level of analysis across all courses that both more clearly shows the integration across all courses and, in doing so, allows for greater alignment and opportunities for integration.

With respect to teacher training and lesson planning workshops, 21PSTEM was to have staff in Cairo to conduct general training and workshop sessions with all teachers to orient them to the curriculum, the software, their instructional materials and lesson planning. Because the intensive training by ECASE staff in country was not possible due to travel restrictions, and because 4:00 am -10:00 am was the only reasonable time to work with teachers from the US, an alternative approach was constructed utilizing Google Drive to share content coupled with GoToMeeting web conferencing for interaction with teachers.

Utilizing the virtual solution 21PSTEM identified 13 staff and external trainers/mentors to work with the teachers in very small groups to transform the designed unit plans into lesson plans for implementation. Each new trainer/mentor received at least 2 hours of pre-training orientation in the overall curriculum philosophy and design and in working with curriculum materials in Google Drive. Each trainer facilitated at least 3 sessions with teachers specifically for their assigned discipline and grade level.

Ultimately, offering a brand new system and technology and launching nearly 100 virtual training sessions in one month was a large undertaking. Many lessons have been gained and the ECASE team has greater comfort in the use of these technologies in this context in an on-going basis. In addition to having a 21PSTEM senior science educator on the ground for 7 weeks to support curriculum 1.0 implementation, there is an overall implementation plan to assure the documentation and integration of improvements to the next iteration of the curriculum. Table 1 shows this plan.

Table 3. 2013 - Fall Semester Curriculum Design & Implementation Plan

	US Curriculum Specialists	Weeks 1 - 4	Weeks 5 - 8	Weeks 9 - 12	Weeks 13 - 16	Week 17 - 18	Week 18
		Sept 22 - Oct 17	**Oct 20 - Nov 14**	**Nov 17 - Dec 12**	**Dec 15 - Jan 9**	**Jan 12 - 21**	**vacation**
A.	***Curriculum Implementation***	*Review lesson plans & respond to teachers*	*Spot check 2-3 LP's and respond to teachers*	*Spot check 2-3 LP's and respond to teachers*	*Spot check 2-3 LP's and respond to teachers*		
		Conduct two lesson writing workshops	*Conduct one group workshop to assess implementation and pacing*	*Conduct one group workshop to assess implementation and pacing*			
		Meet with Deborah every other week to review work & relevant curriculum coordinators' info	*Meet with Deborah every other week to review work & relevant curriculum coordinators' info*	*Meet with Deborah once to review work & relevant curriculum coordinators' info*	*Meet with Deborah once to review work & relevant curriculum coordinators' info*	*Meet with Deborah once to review work & relevant curriculum coordinators' info*	
B.	***Coordination for Semester 2***		*Review and finalize all learning outcomes and resources*		*Conduct one lesson writing workshop for semester 2*	*Conduct two lesson writing workshops for semester 2*	
C.	***Assessment Writing***		*First meeting with assessment team*	*Planned by assessment team*			
D.	***Review for year 2***	*Keep notes*	*keep notes*	*keep notes*	*Collate*	*Conduct review with teachers of semester 1 implementation and needed modifications*	*Conduct in house review of total semester 1 implementation and support and needed modifications*

Discipline Coordinators	*Coordinate implementation in discipline and use of PARLO*
	Conduct weekly department meetings
	Submit weekly status reports to principals and Deborah (Math forwarded to Vivian) (PARLO to Deanna and Donna)

In addition to curriculum implementation for the disciplines, TIES was working with capstone leaders at the schools to define the implementation of the capstones for the first semester. Training in this area was similar to the training provided for the curriculum and professional development, but offering multiple training sessions for not only capstone leaders, but for all teachers. The goal of the capstone team was to provide enough facilitation that the capstones could be operationalized and sustained by the teachers, utilizing a set framework provided by TIES. This framework provides capstones do the following:

- focus on the Egyptian Grand Challenges
- support the teaching and learning of the curriculum
- enable teachers to be facilitators of student work
- designed and implemented by teams of students
- research, propose and/or develop STEM projects that address real-world problems
- document process in Capstone Process Journal
- develop models and/or prototypes and demonstrate competencies
- document learning in the Capstone Exhibition, poster presentation
- enable mentoring for students with expert STEM professionals
- demonstrate learning through a rubric-based, juried assessment process

During the past quarter, TIES worked with all grades to define the capstones for the first semester, offered at least three training sessions for capstone leaders and held 3 sessions for each grade level of teachers. These sessions clarified the Capstone Process and Products to support implementation and evaluation. As a follow-up, a capstone calendar was created for each capstone by Semester and Grade. The calendar provided a session-by-session recommended set of activities to be carried out by the capstone teams during their two-per-week capstone sessions. The calendar also provided topical questions or themes that followed the sequence of the engineering design process over time. These questions provided each capstone team with a framework to guide their activities. The document provided support for the integration of curriculum into the Engineering Design Process (EDP) for the Capstone work.

The Capstone experience is delivered through the EDP. Proficiency in carrying out the capstone experience is evaluated and guided by two process elements. The EDP Portfolio is a team evaluation based on the EDP Portfolio Rubric that is grounded in research and evidence while the individual process evaluation is part of the Personal Journals.

To further facilitate this work, TIES and World Learning integrated the capstone work and process into Google Drive, enabling access to and grading of student work such as Student Personal Journals and Team Engineering Design Process(EDP) Portfolios.

In addition, the team offered standard office hours and weekly meetings with the capstone leaders. These regular touch-points were used to guide the facilitators, formalize and finalize final process documents and rubrics, and to co-create a Capstone Leader Manual to be applied to future semesters. Further training and support of the Capstone leaders will be on-going into the next quarter.

To **develop comprehensive assessment instruments aligned to STEM curriculum (Activity 4.2)**, 21PSTEM worked on several tasks, as shown below.

Co-development of End-of-course assessments (Task 4.2.2):
The Egyptian Ministry of Education has decreed that,

A technical board shall be formed to develop the examination items and questions for each individual subject area as well as to assess the projects. The technical board shall consist of four members, as follows:

(1) Subject area advisor
(1) Expert in Stem Education
(2) Professors from universities and think tanks to be nominated by the Scientific Research Academy, among other parties, at the discretion of the Board of Directors

While it is unclear at this time whether or not representatives of 21PSTEM will serve formally on the subject area boards, 21PSTEM is prepared to play a role as advisor to the subject area boards for math and science. Upon request, the 21PSTEM team will begin developing recommended end-of-semester tests for each math and science course, focusing first on tests for Semester 1. These tests will be based on the Learning Outcomes that are driving the STEM school curriculum and classroom instruction. These end of course exams will play a critical role in ensuring that the curriculum, instruction, and assessment system are aligned and serving the schools' mission to address Egypt's Grand Challenges. The 21PSTEM assessment group will be heading this effort with input from other 21PSTEM groups: both from the Curriculum Development team and from the team supporting teachers in curriculum implementation.

Research and develop appropriate Egyptian college-readiness assessment system (Task 4.2.3): 21PSTEM continued to implement ECASE's plan to replace the Thanaweya Amma in making decisions about college placement for students who will be graduating from 6th of October High School in the spring of 2014. The plan calls for placing students based on an individual score comprised of 40% scores on an internationally benchmarked test of college readiness/aptitude (probably the ACT), 20% Misconception Inventories, 20% Capstone, 10% discussion and participation, 5% laboratory experiments, and 5% research/presentation.

<u>College Readiness Test</u> - This quarter there was an important change in overall plans, as ECASE learned that the MOE has decided that the ACT or other major internationally benchmarked college ability test should be administered in Arabic, not English. 21PSTEM investigated current commonly used internationally benchmarked tests designed for end-of-high-school students (e.g., TIMSS Advanced, SAT, ACT). None have an Arabic version available. ACT was contacted about obtaining, translating, and using a released copy of their test. Their response was very positive, and the team is hoping to receive permission shortly.

Simultaneously, ECASE received permission to translate and use released TIMSS advanced items. The TIMSS is a backup plan, as TIMSS was not designed to assess college readiness. 21PSTEM will also contact the College Board about using the SAT—but the SAT is also a backup plan. Assuming permission to use the released ACT it will be translated into Arabic and back translated to English. In addition there are plans to work with a small number of bilingual high school seniors, having them read the translated items and identify any confusion. (Note: this plan can be implemented for the SAT the TIMSS Advanced, should ACT not grant permission to use their test.)

Misconception Inventories – 21PSTEM received permissions to use and/or modify items from Calculus, Biology, Earth Science, and Chemistry concept inventories as a basis for the concept inventories to be used as part of the battery replacing Thannawaya Amma. Tentative permission was also given to use two Physics concept inventories. A process has been initiated to develop a pool of candidate items, from which final items will be selected based on their match to the STEM school curriculum. The final selection will be made with the help of 21PSTEM's curriculum efforts. Some items in trigonometry and statistics may need to be developed because there are no available concept inventories in those areas that contain the types of conceptual items being sought. Given these extra tasks, the test should be completed by the end of the next quarter. Concept inventories will be piloted in January 2014.

Laboratory Experiments and Research/Presentation will continue to be graded in conjunction with their Capstone and classroom work.

Finally, **creation of e-portfolio with rubrics and tools (Task 4.2.5),** will be enabled by the integration of the Engineering Design Process and rubric into the capstone grading and PARLO tracker. A broader portfolio beta test is being considered, pending identification of students for the pilot.

During the next quarter the following is expected:

- Administer practice ACT in English
- Develop the pilot version of the Concept Inventories—to be piloted in January
- Develop recommended semester tests for each math/science course
- Refine and pilot the 21st Century Skills measurement instrument
- Receive permission to translate/use the ACT released items (or use backup plan)
- Translate ACT or other test

In Q4, to **build the capacity of the National STEM Board (Activity 4.3),** TIES created a training package for the national Board of STEM schools. Because of travel restrictions and minimal school activities, no further progress has been made in this area. Further, work with the National Board to design a Network Framework and networked schools (Activity 4.3) is on hold, pending principal and teacher stability within the existing schools and the creation of additional new STEM schools in Egypt. Hopefully training for the National Board can be scheduled in the next quarter as there are many newly appointed members and the new schools will require much of their attention.

Objective 5: Support the MOE in the upgrading of science and mathematics curriculum standards, students assessment, and teacher preparation for the mainstream.

No work was conducted in this area during the 4th quarter due to travel restrictions and a focus on priorities surrounding the curriculum.

Challenges and Resolutions

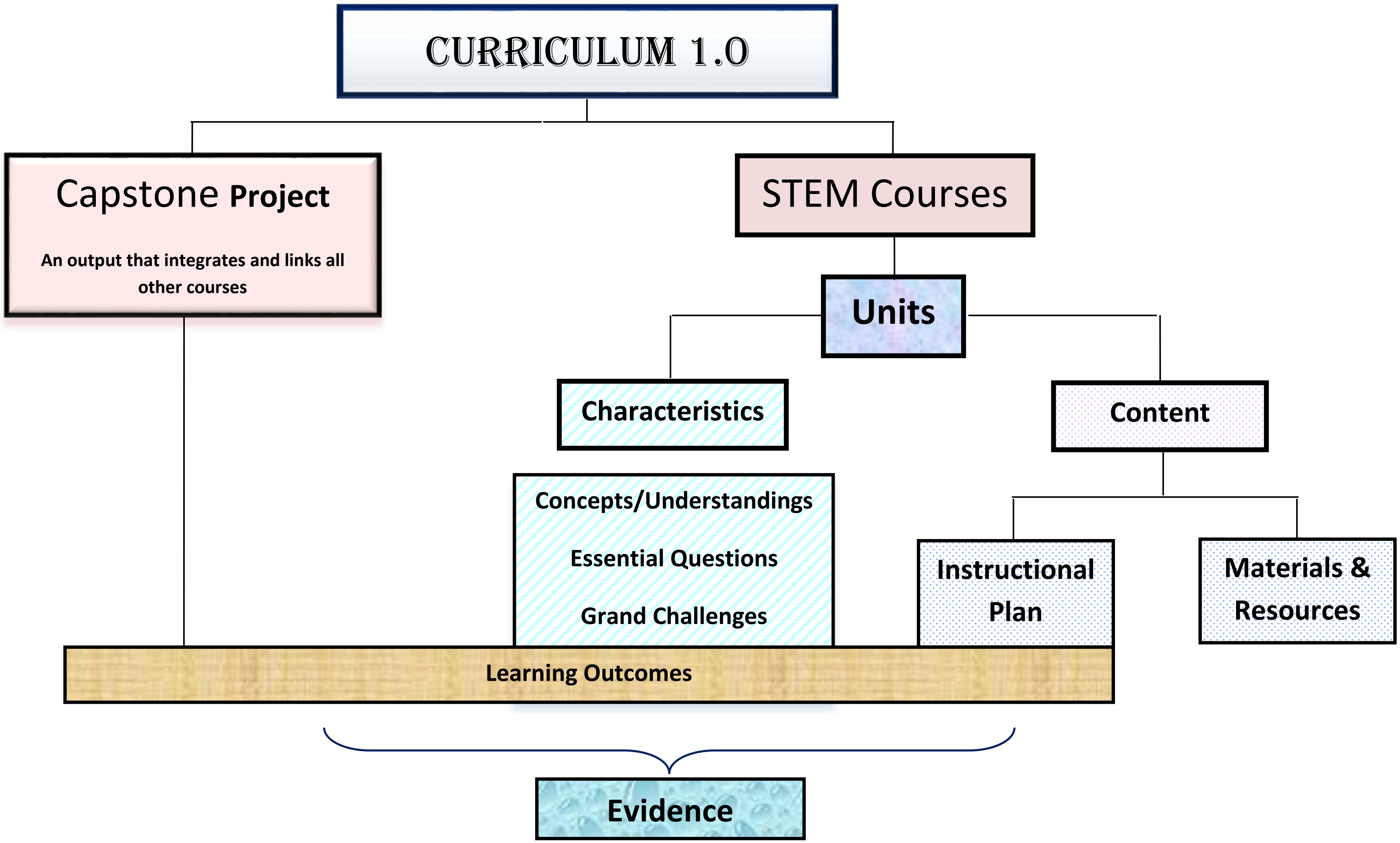
The current political situation is improving but still rife with uncertainties. While US based consultants are seriously considering resuming their trips to Egypt, ECASE does not expect the number of in-country training it needs to provide the necessary support in schools to increase as needed. The upcoming trial date and the following one day holiday constitute an opportunity for trouble and Consultants are aware of that.

The pulling out of Misr El Kheir as a partner to the MOE to to fund the accommodation and school staff salaries presents a risk to the continuation of the STEM schools' activities. This funding is essential for the schools and its delay may cause hardships for the students and teachers which may very well prevent the latter from performing their activities. A 50% funding installment was supposed to be transferred to the schools in September and by end of month, this amount has not been received by the MOE. ECASE tried to contact MEK's leadership several times but there was no response.

The quality of teachers hired this year by the two schools has not followed the selection criteria set by ECASE and, therefore, jeopardizes the quality of education provided to the students in spite of the training provided. ECASE had to resort to hiring university teachers on a part time basis as consultants to teach the third year grade in the October School.

The university teachers hired in the schools are tied to a teaching schedule at their respective universities and we anticipate a challenge in accommodating their schedules and that of the schools. This will have to be resolved as early as next quarter to allow for the smooth operation of the schools and their classes.

Annex A: Curriculum Ver. 1.0


CURRICULUM 1.0
Capstone Project
An output that integrates and links all other courses
STEM Courses
Units
Characteristics
Content
Concepts/Understandings
Essential Questions
Grand Challenges
Instructional Plan
Materials & Resources
Learning Outcomes
Evidence

hide	Concepts/Understandings	**Semester 1**													
hide	Essential Questions														
hide	Learning Outcomes														
hide	Grand Challenges	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
year	Course														
1	*Science Theme*	***Matter, Form & Function***													
1	*Capstone Year 1*	*Sustainable Structures*													
1	*Capstone (details)*														
1	*Math 1*	*Modeling and Functions: Linear, Quadratic, Piecewise*						*Modeling with Geometry*		*Trigonometry*		*Vectors*			*Measuremen*
1	*Math 1 (details)*														
1	*Physics 1*	*Introduction to Mechanics*				*More Mechanics*					*Structures*				*Simple Machines, Work and Energy*
1	*Physics 1 (details)*														
2	*Science Theme*	***Change, Equilibrium and Cycles***													
2	*Math 2*	*Probability*		*Modeling with Functions: Trigonometric Functions*				*Coordinate Geometry*		*Complex Numbers*			*Combinatorics*		*More Derivatives*
2	*Math 2 (details)*														
2	*Physics 2*	*Earth becomes a Planet*				*Physical Changes over the History of the Earth*			*Updrafts, Lightning and Electricity*			*Electricity...Forces and Fields*			
2	*Physics 2 (details)*														
3	*Science Theme*	***Communication, Sensing, Information Processing, Infomatics***													
3	*Math 3*	*The Calculus of Exponential and Logarithmic Functions, Growth and Decay*				*The Calculus of Plane and Solid Figures*			*Techniques of Integration*			*Calculus of Motion - Averages, Extremes, and Vectors*		*The Calculus of Functions Defined by Power Series*	
3	*Math 3 (details)*														
3	*Physics 3*	*Electrostatics*			*Moving Charges*			*Inductance*		*Optics*			*Thermodynamics*		
3	*Physics 3 (details)*														

show	Concepts/Understandings	**Semester 1**													
hide	Essential Questions														
hide	Learning Outcomes														
hide	Grand Challenges	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
year	Course														
1	***Science Theme***	***Matter, Form & Function***													
1	***Capstone Year 1***	***Sustainable Structures***													
1	***Capstone (details)***														
1	***Math 1***	***Modeling and Functions: Linear, Quadratic, Piecewise***						***Modeling with Geometry***		***Trigonometry***		***Vectors***			***Measuremen***
1	***Math 1 (details)***	Modeling is the process of choosing and using appropriate mathematics to analyze situations, to understand them better and to make fair decisions. A mathematical model is an analogy. A real world system works like its mathematical model, so the mathematical model can predict what will happen in the real world. Functions describe situations where one quantity determines another. In mathematics, the functions have inputs and outputs. Graphs can be used as visual representations to investigate relationships between quantitative data. In addition to graphs, relationships can be represented by tables, verbal descriptions or equations. The correlation coefficient is a measure of how well a "line of best fit" works to model the relationship between two quantitative variables. Complex numbers reinforce the tremendous power of abstract thinking and the mathematical tools that facilitate it. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.						Geometric shapes, their measures and their properties can be used to describe things and help in designing/building problems. Applying what you know about two-dimensional figures to three-dimensional figures in real-world contexts, builds spatial visualization skills and deepens understanding of shape and shape relationships. Logical thinking is needed to prove theorems involving similarity and congruence. Rigid motions followed by dilations define similarity in the same way that rigid motions define congruence.		The definitions of sine, cosine and tangent are founded on right triangles and similarity. Along with the Pythagorean Theorem, they are fundamental in many real-world and theoretical situations.		Geometry can be used to create a concrete model of very abstract concepts from subjects as diverse as physics and psychology. Many phenomena can be better understood if you break them down into components. Many problems can be solved by changing the way you describe them, e.g. changing the point or frame from which you are measuring, choosing different axes, changing the scale of one or more variables, changing between Polar and Cartesian coordinates.			Measuremen (volume) and dimensions help us describe the world and everything in it. They play a key role is solving design problems.
1	***Physics 1***	***Introduction to Mechanics***				***More Mechanics***					***Structures***				***Simple Machines, Work and Energy***

1	*Physics 1 (details)*	Working notion of Physics as How Things Work Importance of pushes and pulls Hooke's Law All measurements have uncertainties (no measurement is exact) Motion can be described in terms of position, velocity and acceleration Motion can be described both algebraically and graphically Complex phenomena can be mathematically modeled .	A ball rolls down a ramp such that a = gsin(*). The period of a pendulum equals 2 pi times the square root of l/g. A simple idealization allows a derivation using the standard kinematic equations Objects at rest remain at rest and objects in motion remain in motion with a constant velocity along a straight line unless acted upon by an outside force. The acceleration of an object is proportional to the net force on it and inversely proportional to its mass. F=ma. Velocities and forces add as vectors. Weight is the force on an object due to the gravitational attraction between that object and the Earth. All objects on Earth fall with the same acceleration due to gravity = 9.8 m/s2 (if air resistance is ignored). Newton's third law states that every force has an equal and opposite force. The two forces act on different objects.	Primary structures are the materials that support the roof and the weight of the material above. Secondary structures maintain the integrity of the building, but are not load bearing. Walls with doors and windows need to re-direct the weight of the material above to primary structures. Flexibility and compressibility are important qualities of building materials that affect design strategies. As natural light is both functional and aesthetically pleasing, there is commonly a desire for increased wall space given to windows.	The effect of simple machines is to reduce the force necessary to move an object at the expense of a greater distance traveled. Mechanical advantage is a measure of the reduced force or increased distance of the device/ strategy. Ramps and pulleys are examples of simple machines. Work and energy are seen as extensions of the formalism of Newton's conception of force. Kinetic energy, gravitational potential energy, and elastic potential energy are three forms of energy. Conservation principles are powerful conceptual frameworks. Energy can be transformed

1							from one form to another, but the energy of a system not acted on by an outside force is conserved.
2	*Science Theme*	***Change, Equilibrium and Cycles***					
2	*Math 2*	*Probability*	*Modeling with Functions: Trigonometric Functions*	*Coordinate Geometry*	*Complex Numbers*	*Combinatorics*	*More Derivatives*

2	*Math 2 (details)*	Probability and expected value predict long-term behavior. Predictions based upon probability usually come true, but not always.	Modeling is the process of choosing and using appropriate mathematics to analyze situations, to understand them better and to make fair decisions. A mathematical model is an analogy. A real world system works like its mathematical model, so the mathematical model can predict what will happen in the real world. Functions describe situations where one quantity determines another. In mathematics, the functions have inputs and outputs. Graphs can be used as visual representations to investigate relationships between quantitative data. In addition to graphs, relationships can be represented by tables, verbal descriptions or equations. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. Trigonometric functions can be used to model periodic phenomena. Trigonometric identities can make it easier to understand and analyze many situations that are modeled with trigonometric functions.	With Cartesian coordinates you can use algebra to get a better understanding of geometry and geometry to get a better understanding of algebra. Logical thinking is needed to prove theorems.	Learning about complex numbers reinforces the tremendous power of abstract thinking and the mathematical tools that facilitate it. With Cartesian coordinates you can use algebra to get a better understanding of geometry and geometry to get a better understanding of algebra.	Permutations and combinations are used to solve many problems in algebra and probability by counting the number of ways a group of things can be arranged. Pascal's triangle and the binomial theorem can be used to simplify and analyze algebraic expressions	The derivative is the instantaneou rate of change. The derivative allows us to encode the small-scale behavior of a function near a particular point. The derivative is a powerful tool to analyze the behavior of functions, including their direction, concavity, and points where they reach extreme values. The derivative of a function is itself a function and can be represented by an equation, graph, table or verbal description.
2	*Physics 2*	*Earth becomes a Planet*	*Physical Changes over the History of the Earth*	*Updrafts, Lightning and Electricity*	*Electricity...Forces and Fields*		

2	*Physics 2 (details)*	Copernicus proposed the Earth was a planet. Galileo explained why we cannot feel this motion. Kepler built on Copernicus' work, with his 3 laws. The force of gravitational attraction between any two masses can be calculated using Newton's law. Weightlessness does not mean the force of gravity is not at work. How we know the size of the Earth: Eratosthenes. How we know the earth was originally molten: equatorial bulge.	Kelvin's study of the earth's cooling led directly to a problem with the age of the sun. How could the sun be burning fuel for millions and hundreds of millions of years? He answered this with a bold hypothesis on gravitational collapse as a source of energy. Seasonal changes in weather and climate depend on the tilt of the earth as it orbits the sun and not on our distance from the sun. Climate is driven by solar radiation and where it strikes most directly. Crucial here are Hadley cells, major currents of air driven by convection currents of hot air rising. Hadley cells directly explain Egypt's climate. A key part of Hadley cells is that the atmosphere is colder as you rise. The atmosphere is composed of Nitrogen and Oxygen. Note: what happens to all the carbon dioxide we exhale? It is virtually non-existent near the surface. The weight of the earth's atmosphere (air pressure) enables us to estimate how high it reaches. The composition of the atmosphere has changed over the the ages, becoming rich in Oxygen.	Heat from solar radiation plays a key role in raising moisture to heights where the air is much colder and so the moisture can condense into larger droplets, ultimately falling to the ground. Hot air rising occurs in three different scales: largest scale is Hadley cells, then thermals, and then particular plumes of hot air from factory smokestacks, even automobile exhaust pipes. Carbon dioxide rises into the upper atmosphere via thermals over cities and particular plumes. Carbon dioxide is a greenhouse gas, reflecting the earth's infra- red radiation back toward the ground. Static electricity accumulates in the atmosphere as it does on the surface of the earth, from encounters, collisions. It is stored and then released as lightning. In examining electric circuits, we learn that the quantity of the flow of electricity is its current measured in Amperes, the gradient of its flow is measured in volts and the resistance of its flow is measured in Ohms. Power combines current and gradient, amps and volts.	Electricity is of two essential characters: the charged bodies bound within atoms, such as protons and electrons; and free electricity which is the flow of electrons. Electron flow comes in two patterns: the distinct burst of a shock of static electricity and the continuous flow of current electricity. There are several important facets to electrical circuits and the currents they support: • the volume of the flow is its current measured in Amperes, • the gradient of its flow is measured in volts • the resistance of its flow is measured in Ohms. Power combines current and gradient, amps and volts. Electric charges can attract or repel each other. Electric charge, like energy, is conserved. When you create a charged body you are not creating new electric charges. You are separating the balanced positive and negative electric charges that were already in the material. Typically, this occurs by adding or subtracting the negative charges, now understood to be electrons. The force of static electricity decreases by the square of the distance between charges and is proportional to the amount of charge. Called Coulomb's Law, the force is a close analogy to Newton's law of gravitation. Electricity and magnetism interact in a distinctive way. An excellent tool for studying this is the solenoid. Field theory also explains the motion of charged bodies.	
3	***Science Theme***	***Communication, Sensing, Information Processing, Infomatics***				
3	***Math 3***	***The Calculus of Exponential and Logarithmic Functions, Growth and Decay***	***The Calculus of Plane and Solid Figures***	***Techniques of Integration***	***Calculus of Motion - Averages, Extremes, and Vectors***	***The Calculus of Functions Defined by Power Series***

3	*Math 3 (details)*	If you know the derivative of a function everywhere, then you know its shape everywhere. This lets you use Euler's method to estimate the value of a function. It also lets you write functions to describe real-world situations like predator/prey relationships. You can define a function to be the definite integral of another function. For example, you can define ln x to be the integral from 1 to x of 1/t dt. The derivative of an exponential is always proportional to the value of the function. This is not true for any other function. A differentiable function has local linearity at any given point.	Big things are made from little things. An analysis of the derivatives of a function gives us an idea of the shape of a function. When the first derivative is zero, the graph of the function has a critical point: a local maximum, local minimum or inflection point. The second derivative gives us information about the concavity of the function. If you think of a dot moving up or down along the graph of a function, then a critical point is where it comes to a stop. From there, the dot can remain stopped, start off again in the same direction, or start off again in a different direction.	Algebra is a powerful tool for learning the techniques of integration. Integration by parts makes things easier if you choose the correct parts. dv must be something you can integrate and u should be something that does not get more complicated when it is differentiated. If something looks Pythagorean, you can translate your Algebra into Trigonometry in order to integrate. To simplify integration of rational functions, you can write many ratios of polynomials that have a numerator whose degree is less than the degree of the denominator: polynomial/polynomial = constant/linear + constant/linear + ...+constant/linear An improper integral is one which has an endpoint of infinity and can be evaluated by using limits.	Displacement (how far and in which direction) is the integral with respect to time of velocity and velocity is the integral of acceleration. Distance (how far) is the absolute value of the integral of velocity. The average velocity equals displacement over time. The calculus involved in finding maximum and minimum values may be extended to problems involving motion, minimum paths. Any vector is a sum of a vector in the x-direction and one in the y-direction. These are its components. To differentiate a vector-valued function, just differentiate the components.	If you know the all the derivatives (first, second, third, etc.) of a function at a point, then you know its shape at that point. The more derivatives you know, the closer you get to the function's shape. This lets you use Taylor series to estimate the value of a function. Power series are amazingly useful for finding approximation of functionsover a certain interval. Polynomial functions are easy and if one could find a way to represent complicated functions as series (infinite polynomials) then one can easily study the properties of difficult functions. Taylor series let you do this. You can create power series for new functions by combining known power series for known functions.
3	*Physics 3*	*Electrostatics*	*Moving Charges*	*Inductance*	*Optics*	*Thermodynamics*	

3	***Physics 3 (details)***	There are two fundamental charges, called positive and negative. Like charges repel each other, while dissimilar charges attract. Charges influence one another by creating fields (both magnetic and electric) around themselves. Electric Fields can be modeled using arrows. The direction of an arrow shows the force that a positive charge would experience in the field at that point. The force on, and energy of a charge at any point in a field is dependent on the position of the charge in the field and the sizes of the charges involved. (Coulomb's Law) Gauss' Law can be used to relate the field produced by a charge or set of charges inside a simple surface.	The definition of current is the amount of charge passing a certain place per unit time. The current in a circuit is determined by the potential difference (voltage) in the circuit and the resistance of the circuit and is represented mathematically by Ohm's law (V = IR) To determine the total resistance of resistors arranged in series (back to back), resistances are added. To determine the total resistance of resistors arranged in parallel (across from each other) we must add the inverses of the resistances and then take the inverse of that sum. Kirchoff's rules for determining current in different loops of a circuit employ the ideas of conservation of charge and energy. A moving charge creates a magnetic field. Magnetic fields can be modeled using arrows that show the direction of the flux lines. Unlike the flux lines of an electric field, the direction of a flux lines in a magnetic field do NOT directly show the direction of the force that a moving charge will experience. The force on a moving charge is proportional to the speed and size of the charge and the strength of the magnetic field it is traveling in. The force is also directed perpendicularly to both the field and the velocity of the charge.	Changing electric fields create magnetic fields. The magnitude of the Emf created in a wire loop is proportional to the rate at which the magnetic flux changes with time. (Faraday's Law) A changing magnetic field around a conductor will induce a current in the conductor such that the induced current opposes the changes in the field that created it. (Lenz's Law) Biology Application: Changing magnetic fields can be used to stimulate electrical responses in the brain. A more modern form of electro-shock therapy Engineering Application: Inductors and RL Circuits Power grid. Step up and down transformers, Rail gun, Magnetically Levitated train, Roller coasters Maxwell's Equations???	Geometric Optics Ray model of light is accurate and convenient for predicting image location, type and size. Different types of lenses and mirrors yield different images. The Lens/Mirror equation can be used to determine image/ object/focus locations. Light refracts, or bends, as it passes from one medium to another. This bending can be described mathematically using Snell's Law. There is a critical angle, when passing from a medium with a high index of refraction to one with a lower index, that can prevent light from escaping. Physical Optics Light is said to have a duality, meaning it behaves both like a particle and a wave. Light diffracts like waves. A distinct pattern appears when light passes through small openings. This pattern is explained by individual light waves meeting at particular locations. Biology Application: The human eye contains a set of lenses that are capable of focusing an image onto the retina. Focusing X-rays How does a microscope work. Something about how lenses can be used to correct myopia... Engineering Application:	The zeroth law of thermodynamics states that if two bodies are in thermal equilibrium (same temperature) with a third body then they are in thermal equilibrium with each other. Temperature is a measure of the average kinetic energy of the molecules and can be measured in 3 different scales which are mathematically related to each other. Changing the temperature of a solid object can result in thermal expansion. Solid object can change their length or volume. Temperature (T), Heat (Q), and Internal energy (Eint) are different quantities that can be related by measuring temperature changes. When heat flows to an object it's temperature change is dependent on the mass of the object and on a property of the material called specific heat. = mc(ΔT). Heat (in or out) is necessary to change the phase of a substance. Latent heat values (L V or LF) determine the mass to heat ratios for individual substances while undergoing a phase change. Q=Lm The Kinetic Theory of gases explains that molecules in a substance are in constant motion and this motion determines the major characteristics of the gas: Temperature, Pressure, and Volume. The ideal gas law relates P, V, and T using a special constant called the gas constant (R). PV = nRT Pressure vs. Volume graphs provide T, Q, Eint,P, and V information along with information to find the work done by a gas. Work done on/by a gas is the area under a P vs.V curve. The first law of thermodynamics relates internal energy, heat, and work. Eint = Q - W A simplified approach to PV diagrams calls for analysis when one variable is

3						held constant. Isobaric (constant pressure), Isothermic (constant Temp) and Isovolumetric (constant volume) and adiabatic (constant heat). Application of heat flow is the study of cycles in a PV diagram. Heat engines and refrigerators are represented by these cycles. The carnot cycle is an ideal engine that is 100% efficient, meaning all heat added to the system goes directly to work done. The second law of thermodynamics says that entropy of a system will tend to increase, meaning the system will move to becoming more chaotic.

hide	Concepts/Understandings	**Semester 1**													
hide	Essential Questions														
show	Learning Outcomes														
hide	Grand Challenges	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
year	Course														
1	*Science Theme*	***Matter, Form & Function***													
1	***Capstone Year 1***	*Sustainable Structures*													
1	***Capstone (details)***														
1	*Math 1*	*Modeling and Functions: Linear, Quadratic, Piecewise*						*Modeling with Geometry*		*Trigonometry*		*Vectors*			*Measuremen*

1	*Math 1 (details)*	1. Students will be able to calculate a least squares regression line, understand its properties, compute and interpret correlation for data and distinguish between correlation and causation. -Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. -Compute (using technology) and interpret the correlation coefficient of a linear fit. 2. Analyze the relationship between two quantitative variables ----Find the slope of a line from two points. ----Use the slope and y-intercept of a line to write and draw equation. ----Describe how changing a number in a linear equation affects the position of its graph. ----Use first and second differences to create models that represent data ----Use technology to explore and analyze various functions.) 3. Create and/or interpret functions that model applied situations focusing on linear models, quadratic models, step functions, direct and inverse variations, constant or variable rates of change. ----Use quadratic functions to solve problems about gravity, etc. ----Identify, interpret and describe real word step functions. ----Recognize when a variable varies directly or inversely as another or as a square of another and represent this relationship algebraically. 4. Analyze functions (linear, step and quadratic) using different representations and be able to reveal and explain different properties of the algebraic function and its graph (e.g. focus of a parabola). ----Build a new function from existing linear and quadratic functions (composition of functions) ----Describe how quadratic functions are related to linear functions ----Identify different characteristics of a function shape, domain, range. Intercepts, max/min ----Solve quadratic equations using multiple methods by inspection (e.g., for x^2 = 49), taking square roots, completing the square, graphing, the quadratic formula and factoring, Derive the quadratic formula, Solve quadratic equations with real coefficients that have complex solutions ----Describe the algebraic transformations that shift a parabola up, down, left and right. ----Write an equivalent form of a given function: find zeros and max/min, properties of an algebraic function ----Perform arithmetic operations with complex numbers: addition, subtraction, multiplication	5. Apply the relationships between 2-D and 3-D objects in modeling situations ----Draw 2-D cross-sections of a representation of a 3-D object. ----Identify three dimensional objects created by rotations of two dimensional objects. 6. Interpret similarity in terms of similarity transformations and geometric relationships ----Apply concept of scale factor to perform a dilation ----Use similarity postulates to solve problems and to prove relationships in geometric figures 7. Use theorems regarding proportionality ----Triangle proportionality, transversal proportionality, triangle angle bisector theorem, triangle exterior angle bisector theorems ----Chord and secant proportionality theorems 8. Proving triangle congruence to solve problems and prove relationships in geometric figures ----SSS,SAS, ASA, AAS 9. Understand and apply theorems about circles ----Identify and describe relationships among inscribed angles, radii, and chords. ----Use the measure of the central angle to find the length of an arc and the measure of an inscribed angle that intercepts the same arc and the area of the sector	10. Define trigonometric ratios and solve problems involving right triangles -Define and apply sine, cosine, and tangent ratios and investigate their domains. -Define and apply inverse trig functions and investigate their domains. -Solve right triangles triangles in applied problems 11. Understand and apply the Pythagorean Theorem and its converse -use the Pythagorean Theorem on a coordinate plane to derive the distance formula -Use the Pythagorean Theorem to solve right triangles in applied problems 12. Apply trigonometry to general triangles -Use the Law of Sines and Cosines in solving measurement problems 13. Investigate quadrilaterals and their properties on the coordinate plane -Recognize the identifying attributes that define each quadrilateral	14. Use vectors meaningfully to represent concepts in thephysical sciences (e.g., displacement, force, velocity) and social sciences (e.g. a list of personality traits). A. Describe a vector using rectangular coordinates, polar coordinates, or engineering (i,j,k)notation B. Discriminate between vector quantities(e.g. displacement, velocity, force, acceleration) and scalar quantities that have magnitude but not direction (e.g. distance, speed) C. Translate fluently among different representations of a vector, including: rectangular coordinates, or engineering (i,j,k) notation, polar coordinates, physical diagrams, verbal descriptions, position vectors. D. Use vectors to model applied problems in areas other than physics. . 15. Use vectors to solve applied problems in statics. A. Find the resultant of two vectors. B. Use scalar multiplication C. Create and solve problems requiring the sum of vectors to be 0. D. Use the concepts of Newton's First Law, Newton's Third Law, the coefficient of E. Solve General Equilibrium problems from statics 16. Use vectors to solve applied problems in dynamics. (This is covered in the Physics class this year 2013-2014. In 2014-2015, it willbe convered by the math teachers) A. Solve 1-dimensional motion problems using the kinematic equations: B. Use the concepts of Newton's Second Law, Newton's Third Law, force, mass, acceleration, time, displacement, initial velocity, terminal velocity, and the coefficient of kinetic friction to set up problems in 1-dimensional and 2-dimensional dynamics. C. Solve 2-dimensional motion problems using the kinematic equations. 17. Solve problems involving 2, 3, or	18. Use volume formulas to solve problems (cylinders, pyramids, prism, cones, spheres) -Use multiple methods to determine volume of a rectangular box -Use Cavalieri's principal -Use the volume of multiple geometric shapes to find the volume of a composite figure 19. Explain how the volume of spheres, cylinders, and cones are related.

			sector.		17. Solve problems involving 2, 3, or 4-dimensional linear relationships by using a vector model or an alternative linear model—and justify your choice of model. A. Solve applied problems by using Vector Equations to model 2, 3, and 4-dimensional lines (e.g., predict the values of variables based on the values of other variables). B. Use the vector representation of line to find the midpoint of line segment or any point a given proportion of the way from A to B. C. Translate fluently among the following representations of linear relationships: Vector, parametric, symmetric equations, point-slope, slope-intercept, intercept, standard, table, graph, story, or real-world situation. D. Explain the strengths and limitations of various ways to model linear relationships, including: What the representation shows about the relationship; Appliedsituations where the representation is particularly useful; How many dimensions the representation can model; Whether or not the representation requires the variables to have a functional relationship.	
1	*Physics 1*	*Introduction to Mechanics*	*More Mechanics*		*Structures*	*Simple Machines, Work and Energy*

1	*Physics 1 (details)*	How can Hooke's law be used to weigh an object? All measurements have uncertainties or random errors. Repeated measurements can vary in accuracy and precision. Random errors can be attributed to the measurement and/or the measuring instrument. Average velocity total distance traveled over a = given time. The slope of a displacement vs. time graph is equal to the velocity. Average velocity total distance traveled over a = given time. The slope of a velocity vs. time graph is equal to the acceleration. Braking distance is dependent on the negative acceleration of the vehicle (brakes, road surface) and reaction time. Models can be used to mathematically describe what happens at a yellow light. An intersection with a yellow light has a STOP Zone and a GO Zone. A safe intersection has an overlap between the GO and STOP Zones. An unsafe intersection has positions which are neither in the STOP Zone or the GO Zone.	Students will be able to derive an approximate expression for the period of a pendulum. Students will be able to explain how an expression for the relationship between two variables can include an irrational number. Students will be able to explain leading consequences of Newton's 3 Laws...e.g. Students will be able to explain why heavier objects do not fall faster. Students will be able to explain why a ball in a wagon rolls to the back when the wagon is pulled forward. Students will be able to explain why the stretch of a spring reflects the weight of an object. Students will be able to explain why the trajectory of a projectile is a parabola. Students will be able to explain why a person can jump straight up and land in the same spot, even though the earth is traveling at thousands of miles per hour the entire time they are off the ground. Students will be able to explain the advantages of a nearly balanced situation with the weights of an Atwood machine.	Students will be able to evaluate types of beams for their structural character. Students will be able to examine the lines of force within a wall. Students will be able to explain how arches and domes work.	Students will be able to describe the forces acting on a object on a ramp, explain its behavior and the mechanical advantage of this simple machine. Students will be able to explain the mechanical advantage of pulley systems and levers. Students will be able to relate changes in gravitational potential to changes in kinetic energy, and vice verse.

2	*Science Theme*	***Change, Equilibrium and Cycles***					
2	*Math 2*	*Probability*	*Modeling with Functions: Trigonometric Functions*	*Coordinate Geometry*	*Complex Numbers*	*Combinatorics*	*More Derivatives*

2	*Math 2 (details)*	1. Use rules of probability to solve problems and predict behavior. -----Explain probability as a numerical description, between 0 and 1, of the likelihood of an event ----Describe events as subsets of a sample space (the set of outcomes) ----Draw tree diagrams to represent and solve counting problems and determine a set of possible outcomes ----Use the fundamental counting principal to solve problems ----understand independence and conditional probability and use them to interpret data ----use the rules of probability to compute probabilities of compound events in a uniform probability model. 2. Calculate expected values and use them to solve problems (heritable traits and diseases) ----Explain the concept of expected value and solve problems using expected values 3. Make inferences and justify conclusions from sample surveys, experiments, and observational studies ----Evaluate random processes underlying statistical experiments and scientific measurements. ----Use random sampling and the rules of probability to draw inferences about a population	4. Analyze the relationship between two quantitative variables ----Observe how a repeating function pattern can arise, give examples of things that behave in a periodic way in the natural world. ----Relate the coordinates of points on the unit circle to the sine and cosine of angles ----Recognize the graphs of sine, cosine and tangent functions ----Describe the inverses of the sine, cosine and tangent functions ----Use technology to explore and analyze various functions.. 5. Create and/or interpret functions that model applied situations. ----Identify, interpret and describe trigonometric functions that model periodic phenomena. ----Generate the graph for sine, cosine and tangent functions from circular motions. ----Construct an equation for a trigonometric function from its graph. ----Model cyclic real-world phenomena with periodic functions ----graph and explain the relationship between the sine, cosine and tangent functions and their inverses. 6. Analyze functions using different representations and be able to reveal and explain different properties of the algebraic function and its graph. ----Identify different characteristics of sine, cosine and tangent functions: shape, domain, range, amplitude, intercepts, max/min, period, asymptotes. ----Interpret the amplitude, period in the context of the function ----Extend the domain of trigonometric functions using the unit circle (convert between radians and degrees) ----Draw and identify positive, negative, and coterminal angles of rotation ----Build new functions from existing functions (composition of functions) -----Describe the transformations that shift and stretch a trigonometric function 7. Prove and apply trigonometric identities ----Derive and apply the Pythagorean Identities ----Manipulate and apply cofunction Identities	8. Prove simple geometric theorems algebraically about intersecting and non-intersecting lines, angles and triangles: complementary, supplementary, vertical, corresponding, etc. ----Find angle size by converting angle measure from degrees to slope and vice versa. ---Recognize and apply the equality of corresponding angles and alternate interior angles in relation to parallel lines and transversals. ---Use the Triangle Angle Sum Theorem in various settings. 9. Analyze transformations of geometric figures: rotations, dilations, reflections, translations. ----Describe and use the three basic types of rigid motions on the plane ----Describe the difference between a rigid motion and a dilation. ----Use matrices to apply linear transformations, matrix animation	10. Represent and use complex numbers ---Perform operations with complex numbers ---Graphically represent complex numbers and their operations on the Argand diagram ----Find the conjugate of a complex number and use it to find moduli and quotients of complex numbers 11. Use complex numbers in trigonometric identities ---Graph using both rectangular and polar coordinates. ---Prove and use DeMoivre's theorem. ---Find the nth roots of unity	12. Represent, analyze and solve counting problems ----Use the Fundamental Counting Principle to solve counting problems ----Use permutations to solve counting problems ----Solve counting problems where some elements are alike ----Determine the number of paths in a block diagram ----Explain the limitations of computers in solving some large problems ----Solve counting problems in which order is not important ----Define what is meant by a combination of n objects taken r at a time ----Use factorials count combinations ----Use combinations to solve block diagram problems 13. Know and apply the Binomial Theorem ----Know and understand the binomial theorem and row sums (Pascal's Triangle) ----Explain the expansion of (x+y)^n in powers of x and y for a positive integer n, where x and y are any numbers.	14. Given an equation, graph or table, analyze the rate of change of the function and apply it to real-world situations. ----Estimate the instantaneou rate of change of the dependent variable with respect to the independent variable at a given point. ---Describe whether the y value is increasing or decreasing as x increases through a particular value.
2	*Physics 2*	*Earth becomes a Planet*	*Physical Changes over the History of the Earth*	*Updrafts, Lightning and Electricity*	*Electricity...Forces and Fields*		

2	*Physics 2 (details)*	Students examine the work of Galileo and Kepler to appreciate how Newton built upon it, and so appreciate the character of the growth of scientific knowledge. Students will be able derive Newton's expression for a universal law of gravitation, and apply it to man-made satellites. Students will be able to explain Eratosthenes argument for the size of the earth. Students will be able to explain how we could know that the earth has an equatorial bulge and why that suggests it was originally molten.	Students will see how physical analysis has led to powerful claims about things we can hardly know directly, such as the original character of the earth and how long it has taken for the earth to cool. This work greatly extended the age of the earth and students will see how it led to other significant work. Students will address a common misconception about the earth, that it is closer to the sun during hotter months. Students will be able to explain convection, linking airflow around a candle flame to Hadley cells. Students will be able to explain why the sir is cooler as you rise; even though you are closer to the sun. Students will be able to calculate how high is the sky from air pressure figures and the composition of the atmosphere.	Students will come to see that there are many facets of our world undergoing changes both subtle and significant, such as the accumulation of carbon dioxide in the upper atmosphere. Students will examine the mechanics of water rising and accumulating in cloud formations, and with it the accumulation of static electricity discharged as lightning. Students will begin their exploration of electricity by looking at circuits and the elements of circuits: current, voltage, resistance, and power.	Students will be able to describe the elements of an electric circuit in terms of: voltage, amperage, resistance and power. Students will be able to explain why we think like charged bodies repel and unlike attract. Students will understand the polarity of magnets and electric charges. They will be able to explain the interactions between magnets and electric current. They will be able to describe the properties of electromagnetic devices like solenoids. Students will be able to describe the conceptual framework for field theory.	
3	*Science Theme*	***Communication, Sensing, Information Processing, Infomatics***				
3	*Math 3*	*The Calculus of Exponential and Logarithmic Functions, Growth and Decay*	*The Calculus of Plane and Solid Figures*	*Techniques of Integration*	*Calculus of Motion - Averages, Extremes, and Vectors*	*The Calculus of Functions Defined by Power Series*

3	*Math 3 (details)*	1. Analyze the derivative of exponential and logarithmic functions in real-world situations. - Explain the Fundamental Theorem: the integral form, graphically and algebraically - Calculate derivatives involving Exponential functions and Natural Logarithm functions - Calculate the integral of the Reciprocal Function - Use logarithmic differentiation to calculate the derivative - Use and apply the derivative of an exponential function to calculate population, compound interest, and depreciation - Use and explain L'Hospital's Rule 2. Apply the definite integral of the six trigonometric functions to model and solve problems - Calculate the integrals of a trig function using the defined properties 3. Write and solve a differential equation graphically and numerically and use the resulting solution as a mathematical model to make predictions and interpretations of a real-world situation -Use resulting differential equations as a mathematical model to make predictions and interpretations of real-world situations, including: population growth and decay problems, bacterial growth, predator-prey problem, etc. - Find the graphical solutions of differential equations by using Slope Fields - Demonstrate an understanding of slope field by first calculating dy/dx and verifying with the graph - Use Euler's method for solving a differential equation numerically. - Apply understanding of differential equations to real world problem solving	Analyze the behavior of functions by investigating critical points. Given a solid or plane figure, analyze the maximum or minimum perimeter, area or volume and use this to solve real-world problems. Apply the definite integral to model and solve problems dealing with arc length and area of a surface of revolution in real-world scenarios.	Recognize when to use a particular technique of integration: integration by parts, trig substitution, partial fractions and use it to solve a problem. Differentiate and integrate any of the six hyperbolic functions and their inverses and use these functions as a mathematical model to solve problems. Apply the definite integral of the inverse trigonometric functions to model and solve problems.	Analyze motion using a derivative: distance, displacement, acceleration, velocity, maximum and minimum paths, linear vs planar motion	Apply geometric sequences and series as mathematical models to real-world situations. Derive and use a power series representation of a function.
3	*Physics 3*	*Electrostatics*	*Moving Charges*	*Inductance*	*Optics*	*Thermodynamics*

3	*Physics 3 (details)*	Students are able to draw diagrams of electric fields for simple arrangements of charges. Students can use Coulomb's law and vector addition (or calculus) to determine the amount of force charges put on each other and can correctly determine the direction of the force based on the types of charges for multi-charge systems. Students can use Coulomb's law and vector addition (or calculus) to determine the electric field strength in a region and can correctly determine the direction of that field based on the types of charges for multi-charge systems. Students are able to correctly apply Gauss' law to parrallel plate capacitors in order to determine the stored charge or electric field.	Students will be able to use Ohm's law to determine relationships between V, I, and R Students will be able to calculate the total resistance of a circuit with resistors organized both in series and parallel. Students will be able to determine V, I, and R for each resistor in a circuit and the circuit as a whole. Students will be able to determine the direction and magnitude of current flow in each loop of a circuit given it's circuit diagram. Students can use the right hand rule to show the direction of the magnetic field around a current carrying wire and can calculate the magnitude of that magnetic field. Students can use a right hand rule to show the direction of the force exerted on a charge moving through a magnetic field.	Students can analyze a problem involving either a changing electric field, and determine the magnitude and direction of the resulting magnetic field, or vice versa. Students will compare Lenz's law to the Law of Conservation of Energy.	Students will be able to create ray diagrams to predict the location of images created by both mirrors and lenses Students will be able to identify types of images Students will be able to create a diffraction pattern and explain the phenomenon that creates the pattern. Students will be able to determine the critical angle of a medium using snell's law Students will be able to differentiate between the properties associated with both the wave and particle model of light Students will be able to compare and contrast light as a wave and as a particle.	Students will be able to state the differences between and properly use in analysis temperature, heat, and internal energy. Students will be able to design an equation to describe a system of objects as they reach an equilibrium temperature. Students will be able to apply the kinetic theory to correctly explain changes in gases. Students should be able to connect the first law of thermodynamics, PV diagrams, and the ideal gas law to correctly predict work done by a gas while undergoing a physical change. Students will be able to categorize cycles as heat engines or refrigerators and determine the efficiency of the cycle.

hide	Concepts/Understandings	**Semester 1**													
show	Essential Questions														
hide	Learning Outcomes														
hide	Grand Challenges	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
year	Course														
1	***Science Theme***	***Matter, Form & Function***													
1	***Capstone Year 1***	***Sustainable Structures***													
1	***Capstone (details)***														
1	***Math 1***	***Modeling and Functions: Linear, Quadratic, Piecewise***						***Modeling with Geometry***		***Trigonometry***		***Vectors***			***Measuremen***
1	***Math 1 (details)***	Why is modeling an indispensable tool? Why do we represent phenomena in multiple ways? How does data help make sense of the world around us? Why do we need an imaginary world? How can things be real and imaginary?						Why is the world three-dimensional? In the real-world, why is the distinction between similarity and congruence not just semantics? Are relationships predictable? How do you know that?		How can relationships help solve problems?		.			How does what we measure influence how we measure?
1	***Physics 1***	***Introduction to Mechanics***				***More Mechanics***					***Structures***				***Simple Machines, Work and Energy***

1	*Physics 1 (details)*	What is the relationship between a force acting on an elastic body and the amount of deformation? If an object is suspended motionless from a spring, the Hooke’s law force is equal to the weight. Why do we expect different measurements will differ? How is velocity defined and how is it measured? How can motion be represented graphically? How is braking distance dependent on speed? How can an intersection with a yellow light be modeled mathematically?	What is the acceleration of a ball down a ramp? What is the relationship between period and length for a pendulum? How do objects keep moving after the force on them ceases to act? How do velocities add? What is inertia (mass)? How does acceleration depend on the force on an object and on its mass? What is weight? What is the acceleration due to gravity? What determines the range of a thrown object? When an object exerts a force on a second object, what force does the second object exert on the first object?	What is the character of effective supporting materials; i.e., primary structures? How can you re-direct the vertical lines of force of weight so that secondary structures, like doors and windows, can be included in the fabric of a wall? How can we determine the relative strengths of materials for both flexibility and compressibility? What strategies, old and new, have been used to increase the amount of wall space given to glass? What other considerations are involved when thinking about large expanses of glass in climates such as Egypt's? How could these be met?	Why are simple machines defined in terms of the reduced force they require? What does this tell us about their original purpose? What do ramps and pulleys have in common? Why is it significant that Newton's 3 laws could be extended to encompass work and energy? Why is it important that we see work in terms of distance in the same direction as the force? Why do we do work when we lift a 1 kg mass, but not when we carry it? What do kinetic, gravitational potential, and elastic energies depend on?

1					When is energy conserved and what does it mean that energy is conserved?

2	***Science Theme***	***Change, Equilibrium and Cycles***

2	***Math 2***	***Probability***	***Modeling with Functions: Trigonometric Functions***	***Coordinate Geometry***	***Complex Numbers***	***Combinatorics***	***More Derivatives***
2	***Math 2 (details)***	What's fair? What's luck? What would a world be without risk?	Why do we represent phenomena in multiple ways? Why is modeling an indispensable tool?	Can things change and still be the same?	How can things be real and imaginary? Why do we need an imaginary world?	Is order really important? Why predict the future?	Is it better to be instantaneou or average? How do you know if the information you have is enough, too little or too much for a precise solution?

2	***Physics 2***	***Earth becomes a Planet***	***Physical Changes over the History of the Earth***	***Updrafts, Lightning and Electricity***	***Electricity...Forces and Fields***
2	***Physics 2 (details)***	What does the force of gravity look like on the surface of the earth? What issues did the Copernican hypothesis raise for Galileo? What issues did the Copernican hypothesis raise for Kepler? How did Newton draw upon the work of Galileo and Kepler to argue that there is a universal law of gravitation? If gravity extends throughout the universe, what is weightlessness about? How could you determine the size of the Earth? How could you know the Earth had originally been molten?	If the earth was originally molten, how long has it taken for it to cool to today's state? What does this suggest about hthe age of the sun...and why is that a problem? How do the motions of the earth as it orbits the sun affect where there are seasonal climatic changes? How does solar energy drive the earth's climates? How can you distinguish and compare convection, conduction and radiation? What is a Hadley cell? Why is it colder as you rise in the atmosphere, when are closer to the sun? What is the character of the earth's atmosphere? How high is the sky? What is it made of? Has it always been this way?	Where does rain come from? Clouds? What role do plumes of hot air play in the presence of carbon dioxide in upper reaches of atmosphere? What is the greenhouse effect? How is there electricity in clouds; so that you have lightning and thunder storms? What is electricity? What model can be used to effectively describe electrical circuits? How are resistance, voltage, current and power determined in an electrical circuit?	What model can be used to effectively describe electrical circuits? How are resistance, voltage, current and power determined in an electrical circuit? What is the character of the force acting between electrically charged bodies? How can you make a charged body? What's happening when you do? What is magnetism? What characteristics mark it as similar to electricity? Is there an interaction between electricity and magnetism? What is electromagnetism? What are electric and magnetic fields?

3	***Science Theme***	***Communication, Sensing, Information Processing, Infomatics***				
3	***Math 3***	***The Calculus of Exponential and Logarithmic Functions, Growth and Decay***	***The Calculus of Plane and Solid Figures***	***Techniques of Integration***	***Calculus of Motion - Averages, Extremes, and Vectors***	***The Calculus of Functions Defined by Power Series***
3	***Math 3 (details)***	How are functions used to solve real-world problems? Why predict?	Why do we have critical points? When are big things made from little things?	When are techniques most efficient? How do we choose what to use?	How can we describe patterns of motion? Why are position and motion important?	How accurate do we need to be?
3	***Physics 3***	***Electrostatics***	***Moving Charges***	***Inductance***	***Optics***	***Thermodynamics***
3	***Physics 3 (details)***	What makes one charge attract another charge? How does understanding electrical phenomena affect our daily lives? What affects you more, gravitational or electrical forces? How could a neutral object have an electrical field?	How is energy transferred by a moving charge? How can we move a charge from one point to another in space? How do the conservation laws apply to circuits? How is a parallel circuit different than a series circuit? What is the difference between an electric field and a magnetic field?	Which came first, a changing electric field or a changing magnetic field? Why might a magnet attract a conductor made from non- magnetic material?	When is the speed of light not the speed of light? What is the best way to magnify a small object so that you can see it? How are photons and light waves related? How can you make a beam of light bend? Is light a particle or a wave? Why do shadows always have fuzzy edges? If a student shines a light through a hole onto a screen, in which spots will no light hit? or how can light be considered dark? what has to happen for light to go missing?	Why is there no such thing as cold? How is it possible to freeze to death in an incredibly hot environment? How can you change the internal energy of a gas? How would you build a device for storing a lot of heat?

hide	Concepts/Understandings	**Semester 1**													
hide	Essential Questions														
hide	Learning Outcomes														
show	Grand Challenges														
year	Course	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
1	***Science Theme***	***Matter, Form & Function***													
1	***Capstone Year 1***	***Sustainable Structures***													
1	***Capstone (details)***														
1	***Math 1***	***Modeling and Functions: Linear, Quadratic, Piecewise***						***Modeling with Geometry***		***Trigonometry***		***Vectors***			***Measuremen***
1	***Math 1 (details)***	Improve the use of Alternative Energies Increase Opportunities to Stay and Work in Egypt Improve Urban Congestion						Improve Urban Congestion Increase Opportunities to Stay and Work in Egypt		Increase Opportunities to Stay and Work in Egypt Improve Urban Congestion		Improve Urban Congestion Improve the use of Alternative Energies Deal with the Exponential Population Growth Increase Opportunities to Stay and Work in Egypt			Improve Urban Congestion Increase Opportunities to Stay and Work in Egypt
1	***Physics 1***	***Introduction to Mechanics***				***More Mechanics***					***Structures***				***Simple Machines, Work and Energy***
1	***Physics 1 (details)***	Increase the Industrial Base Improve Urban Congestion				Increase the Industrial Base Improve Urban Congestion Work to eradicate Public Health Issues/Disease					Increase the Industrial Base Improve Urban Congestion Work to eradicate Public Health Issues/Disease				Increase the Industrial Base Improve Urban Congestion Work to eradicate Public Health Issues/Disea
2	***Science Theme***	***Change, Equilibrium and Cycles***													
2	***Math 2***	***Probability***		***Modeling with Functions: Trigonometric Functions***				***Coordinate Geometry***		***Complex Numbers***			***Combinatorics***		***More Derivatives***

2	*Math 2 (details)*	Work to eradicate Public Health Issues/Disease Deal with the Exponential Population Growth Improve Urban Congestion	Improve Urban Congestion Improve the use of Arid Areas	Improve sources of Clean Water Improve the use of Arid Areas Improve Urban Congestion Increase Opportunities to Stay and Work in Egypt	Increase Opportunities to Stay and Work in Egypt	Deal with the Exponential Population Growth Improve the use of Alternative Energies Improve sources of Clean Water Improve the use of Arid Areas Improve Urban Congestion Increase the Industrial Base Increase Opportunities to Stay and Work in Egypt Recycle and retain garbage for Recycling Reduce Pollution Work to eradicate Public Health Issues/Disease	Deal with the Exponential Population Growth Recycle and retain garbage for Recycling Increase Opportunities to Stay and Work in Egypt
2	*Physics 2*	*Earth becomes a Planet*	*Physical Changes over the History of the Earth*	*Updrafts, Lightning and Electricity*	*Electricity...Forces and Fields*		
2	*Physics 2 (details)*	Recycle and retain garbage for Recycling Improve sources of Clean Water Increase the Industrial Base					
3	*Science Theme*	***Communication, Sensing, Information Processing, Infomatics***					
3	*Math 3*	*The Calculus of Exponential and Logarithmic Functions, Growth and Decay*	*The Calculus of Plane and Solid Figures*	*Techniques of Integration*	*Calculus of Motion - Averages, Extremes, and Vectors*	*The Calculus of Functions Defined by Power Series*	
3	*Math 3 (details)*						
3	*Physics 3*	*Electrostatics*	*Moving Charges*	*Inductance*	*Optics*	*Thermodynamics*	
3	*Physics 3 (details)*						

Title	**INTRODUCTION**
Document	Unit Plan
Authors	Deborah Pomeroy
Subject	Science
Course	Chemistry 1
Topic	Introduction to curriculum, to book and to the nature of science
Location	6 October
Grade(s)	10

Standards

Established Goals

Students will understand the nature of science and recognize scientific processes as they apply to the generation of knowledge.

Transfer

Students will be able to apply their understanding of the nature of science across all scientific disciplines and differentiate between the scienes and humanities.

Concepts/Understandings

- Nature of Science
- Theories and Laws
- Science vs Pseudoscience
- Science and Society
- Overview of the curriculum
- Strategies for Using the *Active Chemistry* book
- Safety in the laboratory
- Expectations for students in terms of keeping journals

Students will know and be able to:

Unit/Essential Questions

How do scientists know something is true?

Learning Outcomes

Students will be able to describe what characterizes science and its methods.

Evidence - Performance Tasks

Debate on how scientists know something is true

Evidence - Rubrics

Students correctly employ arguments based on the learning outcomes listed on p. NS1 including discussion of:
a) how it applies to real situations;
b) the role of alternative explanations to explain data;
c) standards that ensure that reliability of information;
d) scientific deductions drawn from scientific observations, independently arrived at throughout the world;
e) the role of creativity in constructing scientific explanations, questions, and methods;
f) scientific questions and the role of hypotheses, models, theories and laws; and
g) the relation of science and society.

Evidence - Other

Learning Plan

Teacher introduces him/herself
Students introduce themselves and where they come from and why interested in STEM

Teacher shows students the 3 year summary of the scope and sequence and has students look for relationships between the capstones, grand challenges of Egypt and the big ideas of chemistry.

Students read through pp. x through xxiii of the Active Chemistry book and become familiar with the functions and expectations of each sectin of the book and of their science logs

Students read p. xxxii

Students read pp. NS1-NS8

Students engage in discussion/debate of the essential question.

Materials Resources - Type

Textbooks

Materials Resources - Description

Active Chemistry

Websites

Attachments

Notes

Title	**Fun with the Periodic Table**
Document	Unit Plan
Authors	Deborah Pomeroy
Subject	Science
Course	Chemistry 1
Topic	
Location	Maadi
Grade(s)	10

Standards

Established Goals

1) Understanding the atomic structure of elements and the resulting periodicity of their chemical and physical properties is critical in understanding their role in industry, in pollution, and in public health.

2) The design challenge like many others in the *Active Chemistry* book consists of designing a game; other chapters involve creating toys,chemistry shows and so forth. In order to ensure that young Egptians will become interested in science, it is important for them to have fun exploring and learning chemistry. Design challenges associated with the *Active Chemistry* curriculum can be thought of as service projects for use in other schools.

Transfer

Elements and Their Properties:
1) Students will be able to compare and contrast the identity and abundance of elements found in typical living organisms and in construction materials.
2) Students will be able to describe how some materials at the atomic and molecular (nano-)level could be used to develop tiny computers, materials that can withstand earthquakes, and methods of delivering drugs to a body's cells.
3) Students will be able to identify elements critical to the industrial future of Egypt, including construction, and will present their findings relating to the availability of strategic natural resources can be limited by accessibility, cost of mining, and by geographic distribution.

Nuclear Reactions: Students will be able to describe the benefits and hazards of nuclear development to human beings.

Line Spectrum: Students will be able to apply their understanding of elemental line spectra to lasers and describe their use in biology, physics, earth science and the construction industry and communications.

Electromagnetic Spectrum: Students will be able to create a chart of the entire electromagnetic spectrum and will provide examples of naturally occurring sources and uses of energy of the spectra in differennt ranges.

Chemical Bonding:
1) Students will be able to apply their understanding of chemical bonding to three-dimensional structures of proteins that are held together by different types of bonds, including covalent links that hold together the molecule's backbone and hydrophobic interactions that hold together the inner core of some proteins.
2) Students will be able to analyze a typical construction material in terms of its chemical composition, bonding and physical properties.

Concepts/Understandings

PERIODICITY AND TRENDS: Elements can be organized according to similar properties, and this organization leads to an understanding about the underlying structure of the atoms of the elements.
ELEMENTS AND THEIR PROPERTIES: Elements can be classified according to their chemical and physical properties and contain only one kind of atom
ATOMIC THEORY AND ATOMIC MASS: The atom is the smallest particle of an element that retains the same chemical reactivity as a larger sample of the element.
PARTS OF THE ATOM: Electrons are subatomic particles that carry a negative charge, are located outside the nucleus, and have a mass which is insignificant when compared with neutrons and protons. Neutrons have an atomic mass of 1, are located in the nucleus and are electrially neutral. Protons have an atomic mass of 1, carry a positive charge and are located in the nucleus.
LINE SPECTRA AND ELECTRON "JUMP": Electrons exist on energy levels outside the nucleus. Electrons can absorb energy which bumps them up to higher energy levels, and when they "jump" back down to their normal energy levels, they release the energy in the form of photons of very specific

wavelengths which are determined by the quantity of energy released.
IONIZATION ENERGY AND ORBITALS: Trends in ionization potential (the energy required to remove the most loosely bound electron from an atom) provide clues as to the electron configuration of atoms. The Noble gases, with 8 outer electrons, have the greatest chemical stability.
NOBLE GASES AS THE KEY TO CHEMICAL BEHAVIOR: In chemical reactions atoms gain, lose or share electrons with atoms of other elements in order to achieve the greatest possible stability of their outer electron configuration.
THE OCTET RULE AND BONDING:
NUCLEAR FORCES - WHAT LIMITS AND DETERMINES AN ATOM'S MASS? Atomic mass is based on the mass of 1/12 of a carbon-12 atom's mass. The number of protons plus neutrons determine an atom's mass. The more protons an atom has, the more neutrons it needs to be stable because of the proton to proton repulsive forces. The energy holding the nucleus together is called binding energy.

Students will know and be able to:

Unit/Essential Questions

How does the Periodic Table help us understand the nature of matter?
How can you investigate things you cannot see?

Learning Outcomes

1) Through laboratory investigations develop operational definitions of chemical elements, and differentiate between metals and nonmetals, and chemical and physical properties.%%
2) Demonstrate understanding of atomic structure, subatomic paricles, their arrangements and the evidence that scientists that enabled scientists to discover them.%%
3) Describe how different colors of light are created by exciting atoms of different elements.%%
4) Select and use data to construct an argument for the existence of strong nuclear forces.%%
5) Predict and justify predictions of chemical and physical properties of unknown elements based on their position in the periodic table.%%

Evidence - Performance Tasks

1)Through laboratory investigations develop a operational definitions of chemical elements, and differentiate between metals and nonmetals, and chemical and physical properties.
- a. Complete Investigations Sceion 2: 1-9
- b. Complelte Essential Questions p. 107 #1-3
- c. Complete Chem to Go p. 108 #1-8
- d. Section 2 Quiz

2) Demonstrate understanding of atomic structure, subatomic paricles, their arrangements and the evidence that enabled scientists to discover them.
- a. Complete Investigations Section 3: 1-13
- b. Complete Investigations Section 4: 1-6
- c. Each student in a group should complete one of the following:
  1. Complete Checking Up 1-4 p. 116
  2. Complete Essential Questions p. 117 #1-3
  3. Complete Chem to Go p. 119-120
  4. Section 3 Quiz
  5. Complete Essential Questions p. 127 #1-3
  6. Complete Chem to Go p. 127-128
- d. Section 4 Quiz

3) Describe how different colors of light are created by exciting atoms of different elements.
- a. Complete Investigations Section 5: 1-9
- b. Complete Checking Up p. 135
- c. Complete Essential Questions p 136 #1-3
- d. Complete Chem to Go p 137
- e. Create and explain a metaphorical model to describe how different colors of light are created by exciting atoms of different elements.

4) Select and use data to construct an argument for the existence of strong nuclear forces.
- a. Complete Investigations Section 9: 1-5
- b. Complete Checking Up p. 182
- c. Complete Essential Questions p 183 #1-3
- d. Complete Chem to Go p 184
- e. Calculate ratios of the relative abundances of protons and neutrons of isotopes of a wide variety of different elements (from very small to very large) and make a generalization about nuclear stability from findings.

5) Predict and justify predictions of chemical and physical properties of unknown elements based on their position in the periodic table.
   a. Complete Investigations Section 6: 1-7
   b. Complete one of the following:
      1. Complete Checking Up p. 149
      2. Complete Essential Questionsp 150 #1-4
      3. Complete Chem to Go p 151
      4. Section 6 Quizp 150 #1-4
   c. Complete Investigations Section 7: 1-4
   d. Complete one of the following:
      1. Complete Checking Up p. 158
      2. Complete Essential Questions p 150 #1-4
      3. Complete Chem to Go p 160
      4. Section 7 Quiz
   e. Complete Investigations Section 8: 1-5
   f. Complete one of the following:
      1. Complete Checking Up p. 167
      2. Complete Essential Questions p 168 #1-4
      3. Complete Chem to Go p 169
      4. Section 8 Quiz
      5. Create a general rule to explain how atomic structure, in terms of electron confuguration, determines function, in terms of chemical bonding.
   g. Complete Mini-Challenge
   h. Complete Chapter Challenge

Evidence - Rubrics

See Teachers' Edition for all Investigations, Checking Up, Essential Questions, Quizzes

Ourcome 3) Task e. High Performnce = model and explanation includes different excitation energies for outer shell electrons and different cascade patterns of the release of different quanta (phohtons) for different elements.

Outcome 4) Task e. High Performance = Correctly calculate and graph ratios of the relative abundances of protons and neutrons of isotopes of a wide variety of different elements (from very small to very large); analyze correctly and make a reasonable generalization about nuclear forces and stability from findings including projecting unknown elements.

Outcome 5) Task f.5. High Performance = Students include unstable outer configurations leading to the loss of 1,2 or 3 electrons, the gain of 1, 2, or 3 electrons and electron sharing to complete outer octet stability.

Outcome 5) Tasks g. and h.. See Teachers' Edition Criteria for Excellence. Teacher and/or students may wish to add criteria.

Evidence - Other

Learning Plan

This unit consists of the following 9 sections, each taking an average of two 90 min periods, a mini-challenge and the chapter challenge.

1) How and why do you organize items in everyday life?
PERIODICITY AND TRENDS: Organizing a Store Different items that are contained in a store are categorized. Then, the section explains what to do with new items that had not been accounted for.

2) What are properties of materials that allow them to be classified as metals or nonmetals?
ELEMENTS ANE THEIR PROPERTIES: The physical and chemical properties of elements are determined and this information is used to organize elements into two categories: metals and nonmetals.

3) How is the relative mass of atoms determined and what does that indicate about the way in which they react?
ATOMIC THEORY AND ATOMIC MASS: The belief in atoms is discussed. The section also shows how the particles of different substances interact with each other in a single-replacement reaction.

4) What evidence is there for the existence of electrons and the nucleus? How does this evidence lead to a model of the atom?
PARTS OF THE ATOM: Electrons and the Nucleus The properties of electrons are discussed and how Rutherford’s experiment determined the location of the nucleus is observed. In addition to this, the section shows that the nucleus is very dense.

5) How does the spectrum of hydrogen provide insight into a model of the structure of the atom?
LINE SPECTRA AND ELECTRON "JUMP": This section shows that when energy is supplied to a hydrogen electron, it is excitedto higher levels and gives off light when it falls to lower levels. This section also shows how to calculate the frequency of light waves and the energy of these waves.

6) How do the ionization energies of electrons provide an organizational structure to the elements?
IONIZATION ENERGY AND ORBITALS: This section shows that each element produces a unique line spectrum and that the ionization potential of the elements aids in the understanding of why the elements occupy certain positions on the periodic table.

7) How does the arrangement of electrons in an atom determine its chemical behavior?
NOBLE GASES AS THE KEY TO CHEMICAL BEHAVIOR: This section shows how to write the electron configuration for all of the elements.It also explains how the electron configuration can be used to show why families of elements behave the same with other elements.

8) How do elements combine to form compounds?
THE OCTET RULE AND BONDING: This section explains why atoms combine in certain proportions by transferring or sharing electrons from one atom to another. The difference between an ionic and covalent bond is also discussed.

9) What is the composition of the nucleus? What forces exist in the nucleus and the atom?
NUCLEAR FORCES - WHAT LIMITS AND DETERMINES AN STOM'S MASS? This section explains how to determine the atomic mass of an element and how the average atomic mass is determined from the common isotopes of an element. The section also gives the factors that determine nuclear stability and describes how fission and fusion differ.

Materials Resources - Type

Textbooks

Materials Resources - Description

Active Chemistry Ch. 2

Websites

Attachments

Notes

Title	**Movie Special Effects**
Document	Unit Plan
Authors	Deborah Pomeroy
Subject	Science
Course	Chemistry 1
Topic	Introduction to Chemical and Physical Properties
Location	Maadi , 6 October
Grade(s)	10

Standards

Established Goals

Students will learn how to conduct tests to determine the physical and chemical properties of materials from explosives construction materials such as concrete and concrete -- all of which are important in industrial development and construction. Students will understand the relation of the properties of such materials as these, water and other materials to industrial processes, pollution and drinking water (public health).

Transfer

Physical Properties of Matter
Biology: Students will be able to apply their understanding of the properties of water to the role of water in living organisms.
Physics: Students will apply their understanding of the physical properties of solid, liquid, and gaseous forms of substances to the interactions of these forms in physics.
Earth Science: Students will be able to apply their understanding of the physical properties of water to their understanding of the role of fresh and salt water in the Earth's hydrosphere.

Chemical Properties of Matter
Biology: Students will apply their understanding of chemical properties of the elements to their understanding of the different distributions and combinations of the elements in biological systems and in the Earth's crust.
Physics: Students will be able to apply their understanding of the chemical properties of substances to the appropriateness of their use in manufactured objects.
Earth Science: Students will be able to apply their understanding of polarity in water to the solubility of ionic substances in the oceans and the processes of dissolving and precipitating of earth materials.

Metals and Alloys
Biology: Students will spply their understanding of the chemistry of metals and metallic ions to biological systems.
Physics: Students will apply their understandng of metallic properties and bonding to the formation and properties of alloys.
Earth Science: Students will apply their understanding of the reactivity of metals to the form in which they are found in nature and the means of extraction, such as gold, found in its pure form, or iron, found in compounds.

Solutions, Suspensions, and Colloids
Earth Science: Students will apply their understanding of solutions to the composition of the atmosphere.

Concepts/Understandings

1) SAFETY - Certain rules must be followed in the chemistry laboratory to assure the safety of all individuals and the environment. Unsafe behavior or practices in the laboratory will result in serious reprocussions.
2) SCIENCE JOURNALS & REPORTS - Scientists take careful notes throughout their investigations, suchnotes play an essential role in scientific learning.
3) COMPOUNDS - Compounds are made up of combinations of elements and are expressed using chemical formulas.
4) PHASE CHANGES - As a substance’s heat energy increases, the substance’s atoms become more active. A solid becomes a liquid, and a liquid becomes a gas. The intermolecular forces that cause the solid state and the liquid state are overcome by kinetic molecular energy.
5) TYPES OF MIXTURES - There are two types of mixtures: heterogeneous and homogeneous. Heterogeneous mixtures are not uniform and include suspensions. Homogeneous mixtures are uniform and include solutions and colloids.
6) SOLUTIONS - A solution is a homogeneous mixture in which one substance is dissolved in another. Ionic compounds dissolve in polar solvents as their ions form intermolecular associations with the solvent. Covalent molecules dissolve in nonpolar solvents but do not break apart.
7) SIGNIFICANT NUMBERS - A number gained through data collection and analysis should only be expressed in significant digits, the digits that indicate the precision of the measurements.
8) DENSITY - Density is the mass of an object or substance divided by its volume, commonly expressed as g/cc. Knowing the density of a

substance allows insight into its composition and behavior, and allows calculations of mass or volume, knowing one or the other.
9) GROUPS OF ELEMENTS - Metals and nonmetals differ in physical and chemical properties. Metals generally have luster, malleability, ductility, conduct heat and electricity, and react with acids. Nonmetals generally are dull, soft or brittle, and do not conduct electricity.
10) ALLOYS - Alloys are homogeneous mixtures of metals that can be optimized for specific purposes, such as strength or corrosion resistance.
11) POLYMERS - Polymers are chains of small or repeating molecular units called monomers and can be engineered to create specific desirable physical and chemical properties. PVA and borax can react to form a polymer “slime,” which is a non Newtonian fluid.
12) ELECTRON EXCITATION - When energy interacts with an atom (or ion), electrons in the atom can move to a higher energy state. When they return to their “ground” state, light energy is emitted. The spectrum of light wavelengths depends on the atom’s electron arrangement.
13) ORGANIC CHEMISTRY - Organic chemistry is the chemistry of carbon-containing compounds, many of which are essential to life. Hydrocarbons are the most abundant type of organic compound.

Students will know and be able to:

Unit/Essential Questions

1) How can we assure that the chemistry laboratory is safe for everyone?

2) How do scientists learn about the nature of matter and discover new things?

3) How are elements and compounds related?

4) How is energy related to change of state and the forces between molecules?

5) What are the possibilities when different substances are added to one another?

6) How do significant figures help you to better represent data?

7) How do volume and mass relate to density?

8) How does knowing the type of matter allow you to best use it for special effects and other special purposes?

9) How can knowing the physical and chemical properties of metals help in creating materials for specific purposes?

10) What are polymers and how can knowledge of their structures help in the design process?

11) How does energy affect the excitation of electrons?

12) What is the importance of the term “organic” in chemistry?

Learning Outcomes

1) Explain the behavior of particles in different phases of matter, explain and diagram energy exchanges during phase phases.%%
2) Explain how the chemical and physical properties of solutions, suspensions and colloids can be used in water treatment.%%
3) Explain changes in physical properties of composite materials.%%
4) Explain how the physical properties of different types of elements, compounds and groups of elements can be used to identify them and be used in commercial applications.%%
5) Recognize the names, structures, formulae and properties of different classes of compounds: ionic, molecular, polymers and simple hydrocarbons.%%
6) Apply understanding of chemical and physical properties.to a creative production.%%

Evidence - Performance Tasks

1) Explain the behavior of particles in different phases of matter, explain and diagram energy exchanges during phase phases.
   a. Complete Investigations Section 2: Parts A-D
   b. Checking Up: p. 15 #1-4
   c. Essential Questions p. 31 #1-4
   d. Chem to Go: p. 19
   e. Complete one of the following

Title : Movie Special Effects
Course : Chemistry 1

1. Create an animation to illustrate the behavior of particles in different phases of matter and as the material changes phases.
2. Draw and explain a phase change chart of water and identify whether energy is being absorbed by the sstm as kinetic or potential and how you know

2) Explain how the chemical and physical properties of solutions, suspensions and colloids can be used in water treatment.%%
   a. Complete Investigation Section 3: Step 2
   b. Checking Up: p. 137 #1-2
   c. Essential Questions p. 37 #1-4
   c. Chem to Go: p. 38-39: 1,2,4
   d. Research primary, secondary and tertiary water treatment and explain in terms of your understanding of solutions, suspensions and colloids

3) Explain changes in physical properties of composite materials.%%
   a. Complete Investigation Section 4: #1-5
   b. Checking Up: p. 43 #1-4
   c. Essential Questions p. 44 #1-4
   c. Chem to Go: p. 45: 1,2,4
   d. Examine a sample of cement and conduct research to prepare an explanation of the nature of cement and why it behaves the way it does; illustrate with drawings and chemical formulas.

4) Explain how the physical properties of different types of elements, compounds and groups of elements can be used to identify them and be used in commercial applications.%%
   a. Investigate Section 5: Parts A-C
   b. Complete one of the following:
      1. Essential Questions p. 57 #1-4
      2. Chem to Go: p. 58-59
      3. Quiz Section 5
      4. Inquiring Further #1 or #2
   c. Investigate Section 6: 1-11
   d. Complete one of the following
      1. Checking Up: p. 64 #1-5
      2. Essential Questions p. 65 #1-4
      3. Chem to Go: p. 66
      4. Quiz Section 6
   e. Inquiring Further p. 67

5) Recognize the names, structures, formulae and properties of different classes of compounds: ionic, molecular, polymers and simple hydrocarbons.%%
   a. Complete Investigations Section 1: #1-12
   b. Complete two of the following
      1. Checking Up: p. 15 #1-4
      2. Essential Questions p. 17 #1-4
      3 Chem to Go: p. 19
      4. Quiz Section 1
   c. Investigate Section 7: 1-11
   d. Complete one of the following:
      1. Checking Up: p. 70 #1-3
      2. Chem to Go: p. 72
      3. Quiz Section 7
   e. Investigate Section 9: Steps 1-4
   f. Complete one of the following
      1. Chem Talk Setion 9
      2. Chem Essential Questions Section 9
      3. Organic Compunds Worksheet
   g. Investigate Section 9: Step 4
   h. Chem to Go: Qustions 3-6

6) Apply understanding of chemical and physical properties to a creative production.%%
   a. Students complete Mini-Challenge
   b. Students complete Chapter Challenge

Evidence - Rubrics

See Teachers Guide for:
- Investigations
- Checking Up
- Essential Questions
- Chem to Go

Quizzes

Outcome 1) Task e.1. High Performance = animation differentiates between the addition of energy as potential (motion) and kinetic (breaking interparticle attraction) and the solid, liquid and gas phases are appropriately illustrated in terms of particle motion and distance and structure or lack of structure.

Outcome 1) Task e.2. High Performance = chart shows temperature increasing or decreasing within a single phase with addition or removal of heat and constant temperature during phase changes. Chart lables different segments of heating and cooling curves and names the different types of heat. Relative amounts of heat are shown by length and/or slope of segments; Melting/freezing and boiling/condensing temperatures are correctly represented. Students use diagram to explain why they get cold when they shower or swim but do not towel off immediately.

Outcome 2) Task d High Performance = correct definition and examples of primary, secondary and tertiary treatment and differentiates between physical, chemical and biological treatment.

Outcome 3) Task d. High Performance = conducting an experiment with different amounts of components of cement, sand and water or different size particles of sand. Results of experiment with tests of strength are presented with an explanation of how important it is for building construction to consist of proper components and relative amounts.

Outcome 6: a. and b. use rubric in teacher's guide, may be added to by teacher or teacher with students

Evidence - Other

Learning Plan

This unit consists of 9 sections. Each is designed to take approximately two 90 min periods lasting a total of 9 weeks.

Learning outcomes 3 and 6 include activities not described in the textbook. Teacher needs to design lesson plan and activity description for these. The concrete activity in learning outcome 6 should include as much experimentation and investigation as possible given the amount of class time available.

Materials Resources - Type

Textbooks

Materials Resources - Description

Active Chemistry Ch. 1

Websites

Attachments

Notes

Annex B: English Proficiency

ECASE ENGLISH LANGAUGE PROGRAM
Quarterly Report, FY 2013, 3rd Quarter, July-September 2013

CONTENTS

1. Intensive Summer Program Background

There has been an urgent demand to run intensive summer English classes for both teachers and students in Ma'ady and October Schools. This demand was claimed by teachers and students who always expressed their inconvenience with having ELP courses during the school year due to their work and study load. Additionally, summer intensive programming was seen as a way to better prepare both teachers and students for the rigors of study in a very different context.

As students begin their studies at the STEM high schools, they experience an environment in direct contrast to the Arabic-language-delivered highly teacher-centered environment found in most Egyptian preparatory schools. STEM courses are delivered in English, and teachers will now evaluate students on their individual initiative, ability to collaborate with others, their ability to comprehend theories and apply them to practical real-life activities, and on their understanding of the world around them. Meeting these demands in English provides a tremendous challenge for STEM school students. All new students joined the course.

Teachers also need support in developing their English skills, so that they feel confident delivering instruction in English, and so that they can more easily engage in STEM-school Professional Development Institute trainings. The curriculum for the Summer Intensive addressed competencies needed for negotiating meaning of academic texts and discussions, effectively interacting with classmates and teachers in English, and comprehending and responding to English-delivered STEM content.

Summer classes were planned to run for 3 intensive weeks for both teachers and students in each schools. However, the plan was subjective to many changes due to the uncertain political situation in Egypt. Eventually, the Teachers program ran on time for 3 weeks as scheduled, while the Students program ran only for two weeks after many suspensions and delays.

A. Teachers Baseline Test:

Two dates were scheduled for a baseline test for all teachers in October and Ma'ady current teachers and potential ones; July 11^{th} and July 25^{th}. The dates have been scheduled in co-ordination with the Ministry of Education. As for the current teachers, twenty three current teachers in October school and Nineteen current teachers in Ma'ady school, total of Forty two teachers in both schools. As for the potential teachers who were still in the hiring process, 19 teachers were requested to take the baseline test. The teachers were notified with the test date by the school principles. Before the test was conducted, a full description of the test and general guidelines and tips along with a complete sample test was e-mailed to all examinees; current and new. The purpose was to orient all teachers with the exam sections, procedures, and guiding techniques and ensure better performance at the exam.

Names List for Current Teachers:

No.	Examinee Name	Major	School
1	Amal Reda	Principle	Oct.
2	Mahmoud Elfouly	Arabic	Oct.
3	Mahmoud ELMahdy	Psychology Worker	Oct.
4	Sayed Desouky	Social Worker	Oct.
5	Saed Atia	Physics	Oct.
6	Ahmed Tawfiq	Science Lab. Specialist	Oct.
7	Mohamed Fawzy Elnashrty	IT	Oct.
8	Hany Mohamed Abdu Mabrouk	Physics	Oct.
9	Saif El Sayed Soliman	Chemistry	Oct.
10	Ehab Mohamed El Dardier	Chemistry	Oct.
11	Hassan Ragab	Biology	Oct.
12	Mohammed Abbas El Said	Math	Oct.
13	Mohammed Fawzy Said Hessien	Math	Oct.
14	Mihammed Eisa	Math	Oct.
15	Abir Ahmed	Frensh	Oct.
16	Phoebe Makram Megaly Barsoom	English	Oct.
17	Zaineb Ahmed	Librarian	Oct.
18	Esraa Ali Mohammed	Biology	Oct.
19	Salwa Soror	German	Oct.
20	Hamada Fahmy	English	Oct.
21	Ahmed Obada	English	Oct.
22	Hesham Abdelrazek	SOcial Studies	Oct.
23	Diaa Aldeen Alsayed	IT	Oct.
24	Nesreen Abd El rahman El Asy	Social Worker	Ma'ady
25	Sahar Mahmoud Fyad	Librarian	Ma'ady
26	Mohamed Ahmed Abd El Halim	Physics	Ma'ady
27	Eman Hosny Mortady Zian	Biology	Ma'ady
28	Abd El Fattah Mostafa Mohamed	Chemistry	Ma'ady
29	Bahaa El Sayed Abd El azeez	Math	Ma'ady
30	Nevine Farg Hamed	Math	Ma'ady
31	Adlia Farag Hussain	Arabic	Ma'ady
32	Mohamed Ali El nagdy	English	Ma'ady
33	Naima Ali Abdel Aziz Habib	German	Ma'ady
34	Eman El Dessouky Mohamed	Frensh	Ma'ady
35	Mohy El deen Abdo mohamed	Social Studies	Ma'ady

36	Mohamed Ibrahim Ali	Computer	Ma'ady
37	Taghreed Fawzy Mohamed	Psychology	Ma'ady
38	Nada Ahmed Shawky	Home Economics	Ma'ady
39	Eman Mohamed Ibrahim	Art	Ma'ady
40	Amera nour Ahmed	Physical Ed.	Ma'ady
41	Belal Abd alla Abd El Salam	Maintanace	Ma'ady
42	Wedad Omar Shaaban	English	Ma'ady

Names List for New Teachers:

No.	Examinee Name	Major
1	Mohammed Ahmed Abd Al Halim	Physics
2	Fatma Badry Mohamed	Math
3	Abd Al Fattah Mohammed El Hussieny	Math
4	Ahmed Abd Al Kader Ibrahim	Math
5	Ahmed Ramadan Ahmed	Arabic
6	Abd Al Atef Sayd Khaleel	Arabic
7	Sawsan Radwan Ahmed Radwan	Arabic
8	Ahmed Abd Al Aziz Mohmed	Math
9	Ashraf Ali Mohammed Ali	Math
10	Ayad Girgis Ayad Shokr	Math
11	Salah El Din Abd Al Satar Hassanen	Physics
12	Mohamed Mohamed Ramadan Fatouh	Physics
13	Ashraf Abd Al Fatah Mohammed	Biology
14	Amal Fahim Bayoumy El Qersh	English
15	Doaa Ragab Mahmoud	English
16	Rezk Mahrous Mohammed Marey	English
17	Tahany Hassan Refaie Mohmed	Geography
18	Amal Mohamed Ebrahim El Ahdal	Computer
19	Manal Mohamed Al Khadrawi	English
20	Hatem Samir Sayed	English
21	Ayman Arnest Amin	Chemistry
22	Mosa El Shahat Mosa	Math

The two tests took place in Sofitel Ma'ady Hotel and were administered and graded by World Learning ECASE English Teachers.

B. Students Baseline Tests:

Two baseline tests were conducted for new grade 10 students; one for 150 male students in October school and another one for 120 female students in Ma'ady school. The test date was August 25th, the date has been scheduled in co-ordination with the Ministry of Education, MOE. The students were notified about the test by the MOE as well. The baseline tests were administered and graded by World Learning ECASE English Teachers. On the test day, students were divided alphabetically into 7 groups in each of October and Ma'ady schools. Almost all the students showed up on the test day. See the appendix for students name lists and grades. These results will serve as a baseline for the project.

C. Description for the Exam:

The Baseline Exam was conducted for both students and teachers to join the Summer Intensive English Language Course. The same Baseline content was used for both students and school teachers in October and Maady schools. The exam was composed of four sections. It is adapted from IElTS to test effectively the proficiency English language level of both the students and the school teachers. This is the second time to use the IElTS exam in assessing the English proficiency level of students and school teachers. The only difference is that the Program this time used the full version of the IElTS exam instead of using Mini-IELTS tests. The Exam is intended to test and evaluate the English language four skills. The four sections of the exam are: listening, reading, writing and speaking. The total duration of the first there sections (listening, reading and writing) is two hours and a half. Timing of the three sections is divided as follows: 30 minutes, 60 minutes and 40 minutes. As for the speaking section, it was conducted directly after the two hours and a half and it is conducted in a form of an interview where the examiner has to use one of the speaking scripts to examine the examiners from the students between 5-6 minutes. It was decided to make the timing of the speaking test between 5-6 minutes instead of 15 minutes due to the huge number of the students in grade 10 who were enrolled to the two schools. As for the timing of the speaking test conducted for the teachers, it was about 10 minutes due to the moderate number of the teachers in the two schools.

The number of questions in the listening section was 40 questions divided over four sections. As for the number of the questions in the reading section, it was 40 as well to be covered over three reading passages. The writing topic required the students and the school teachers to write an opinion essay. The speaking rubric and writing Task 2 rubric were used for assessing and evaluating students' and school teachers' papers.

D. Description of the School Teachers' Performance in the Baseline exam:

The Baseline Exam conducted in July for the school teachers was the second baseline exam to be conducted for the teachers in two months. In the first exam, the teachers complained that they were not well prepared for the exam. So, a sample from the exam types of questions, number of sections, timing and rubrics was designed to be shared with the school teachers before their second IELTS exam. The total number of the teachers who attended the exam as a second attempt in October school was 16 teachers. Three teachers were absent. As for Maady school, the number of the attendees from the teachers was 11 teachers. All of them were second attempt except one case. In addition, the number of the absence was two.

Analyzing the Baseline Exam for teachers' grades in October school, it was found that the lowest band in listening is (0.6) and the highest band is (5.8). As for the reading section, the lowest band is (0.9) and the highest band is (5.4). The lowest band in the writing section is (1) and the highest is (6.4). The lowest band in speaking is (3) and the highest band is (6.4). As for the overall average, the lowest band is (1.6) and the highest band is (5.8).

Analyzing the Baseline Exam for teachers' grades in Maady school, it was found that the lowest band in listening is (1.1) and the highest band is (4). As for the reading section, the lowest band is (0.6) and the highest band is (4.9). The lowest band in the writing section is (1.5) and the highest is (5.4). The lowest band in speaking is (2) and the highest band is (5). As for the overall average, the lowest band is (2) and the highest band is (4.3).

E. Description of the Students' Performance in the Baseline Exam:

The total number of students attended the Baseline Exam in October school was 149. The number of the absentees was eight students. Analyzing the Baseline Exam for students' grades in October school, it was found that the lowest band in listening was (0) and the highest band is (6.5). As for the reading skill, the lowest band is (2) and the highest band is (7). The lowest band in the writing skill is (1.5) and the highest band is (7). The lowest band for the speaking skill is (1.5) and the highest band is (6).

The total number of students attended the Baseline Exam in Maady school was 73. The number of absentees in Maady school was eight students. Analyzing the Baseline Exam for students' grades in Maady school, it was found that the lowest band in listening was (0) and the highest band is (7). As for the reading skill, the lowest band is (0) and the highest band is (6). The lowest band in the writing skill is (0) and the highest band is (7.5). The lowest band for the speaking skill is (0.7) and the highest band is (5.8).

F. Placing the Students and the Teachers in the English levels:

The CEFR bands for the four sections of the IELTS were used to decide on the bands of the grades. Also, the CEFR bands were used to decide on the overall average of the grades to decide on and to the English level of both the students and the school teachers and to place the students in the appropriate English level. CEFR bands were not used to place the school teachers in the English levels. However, a decision was made to place those school teachers who scored less than 2.5 in the Basic Lower English level and those who scored above in the Basic Higher English level.

G. English Levels for the School Teachers:

The English levels offered for the school teachers in both October and Maady were as follows: The Lower Basic English Level and the Higher Basic English Level. School teachers were assigned to the two levels based on their overall average grades in the Baseline Exam. Those who scored less than 2.5 as their overall average joined the Lower Basic English level and those who scored higher till 5 as their overall average joined the Higher Basic English level. The school teachers who scored higher than 5 as their overall average did not join any of the English classes. Those who scored higher than 5 are the some of the English teachers in both schools.

H. English Levels for the Students:

The English levels offered for the students in both October and Maady schools were as follows: Basic 1, Basic 2 and Pre-Intermediate. Students were assigned to the three levels according to their overall grades in the Baseline exam. Students who scored 2.5 and less joined the Basic 1 English level. Those students who scored between 3 and 3.9 joined the Basic 2 English level. Students who scored between 4 and 5.25 joined the Pre-Intermediate English level.

2. CURRICULUM PLANNING AND IMPLEMENTATION:

A. School Teachers Summer Intensive Course:

The curriculum designed for the school teachers aimed at addressing their English language needs in a communicative and interactive way. The duration of the course was three weeks/ 4 5 times a week. The class lasted each day for about 5 hours. There were two sessions each day. Each session lasts for 2 hours and a half. Each session covered two skills. The first one is for listening and speaking and the second one is for reading, writing and grammar. The type of writing to cover in both levels was paragraph and essay writing. Teachers were divided in the classes based on their most relevant subject areas that they teach. The curriculum for the first two weeks was designed in a way to include the scientific themes they teach with the STEM themes and concepts. As for the last week (the third one), teachers were offered some IELTS practice based on the decision that they will sit for the exit exam after the three weeks. So, all the materials offered for week three was adapted from (IELTS Master Class) and (Focus on IELTS).

Materials were compiled from different sources such as: World English 1 and 2, Path Ways 2 and 3, Global Perspective; Upper Intermediate, Read Ahead 2, Reading Explorer 1 and 2, Active 2 and 3. A new approach was added to the curriculum which was the target vocabulary and the glossary at the end of each theme. Each week, materials and the curriculum were covering an integrated theme. The material used for Lower basic is the same for Higher Basic with some adjustments and alterations used and adapted by the English teacher in the course.

The assessment strategy was set as follows:

1) Tests (30%)

2) Vocabulary quizzes (15%)

3) Presentations (35%)

4) Portfolio (20%)

Each Day, a vocabulary quiz was assigned to the school teachers covering the target vocabulary. Three presentations were conducted at the end of each week in groups.

B. Teachers' Final Exam Results for the Summer Intensive Course:

School teachers in both schools sat for the final exam for a three weeks summer intensive English course. It was decided that no Exit Exam will be offered to the teachers and that the Exam will be offered at the end of the academic year to be able to accurately measure their progression and improvement.

As for the final test, the test included all the skills (listening, reading and writing) except the speaking skill. It was tested in the final presentation. There were two tests: one for the Lower Basic English Level and the other one for the Higher Basic English Level. Despite that this both levels used the same materials, but observations and school teachers' feedback revealed that the Basic Lower level is not going on the same pace as the Higher one. Thus, it was decided to develop two tests with two different reading and listening questions with different levels of difficulty but addressing the same themes.

A portfolio checklist is designed to help students track their progress and improvement. The checklist includes sections for the vocabulary quizzes, reflection papers on their writings (sentences, paragraphs and essays), tests, glossary, presentation references and any other activities.

The number of the school teachers who attended the final test in Maady school is 14 teachers in Lower Basic English Level out of total number 15 out of 15. The highest grade in the final exam is (15.4/20) and the lowest grade is (8/20). The highest percentage for the total score is (90%) and the lowest is (70%). As for the Higher Basic English level, the number of attendees was 9 teachers out of 9. The highest grade in the final exam is (19.5/20) and the lowest grade is (15.5/20). As for the highest percentage for the total score, it is (97.4%) and the lowest percentage is (69.7%).

The number of the school teachers who attended the final test in October school is 3 teachers in Lower Basic English Level out of total number 11. The highest grade in the final exam is (15.1/20) and the lowest grade is (8.4/20). The highest percentage for the total score is (60%) and the lowest is (40.5%). As for the Higher Basic English level, the number of attendees was 9 teachers out of 9. The highest grade in the final exam is (18/20) and the lowest grade is (14/20). As for the highest percentage for the total score, it is (78.7%) and the lowest percentage is (30.5%).

C. Students' Curriculum for the Summer Intensive and the Regular English Classes:

The curriculum offered for the students in both schools was intended to address their communicative skills and needs. The aim of the course was to enhance their accuracy and fluency in both speaking and writing skills. Due to certain circumstances, the intensive course ran for two weeks only. The course ran every day from 9 till 4. The course syllabus is divided into four sessions every day. The first one covers the listening and the speaking skills. The second session covers the reading and the writing skills. The third one covers integrated grammar and speaking. As for the fourth one, it covers extended reading. The time of each session is 1 hour and 15 minutes, except for the fourth session, it lasted for 1 hour.

The themes of each week were selected based on the English proficiency level of the students in each level. Themes chosen for the Basic 1 and 2 levels were related to everyday English language topics to suit their levels. These themes have been modified somehow in the regular classes to include some STEM themes and topics according to the students' levels. As for the Pre-Intermediate, the themes all over the intensive and the regular classes have been related to STEM and scientific topics. Materials for the two levels were compiled from different academic sources including; World English 2 and 3, Path Ways 2 and 3 for Listening, Speaking and Critical Thinking, Pathways 2 and 3 for Reading, Writing and Critical Thinking, Read and Reflect 2, Effective Reading 1. The materials used for Basic 1 and Basic 2 is the same but with some modifications and challenging activities and tasks for Basic 2.

The assessment strategies for the two levels are:

1) Vocabulary quizzes: 10%

2) Presentations: 30%

3) Tests: 40%

4) Portfolio: 20%

A new item was added this academic year for semester one which is extended reading. The purpose behind the extended reading is to boost the reading fluency and speed of the students. The materials used for the extended reading is short stories and Graded Readers with different stages ranging from 1 till 6. An orientation for the English teachers of the course was given on how to use teach extended reading. Students showed their interest and enthusiasm to read and evaluate the stories provided for them by their teachers. Teachers assigned students certain number of pages and asked the students to read individually, in pairs or in groups. The students sometimes listen to the audio of the stories while reading. Students filled in an evaluation sheet on what they read, where they have to state the title of the story they read, actual number of pages they finished and what they liked about the story. A new type of assessment is going to be designed to evaluate students' reading speed to measure the effect of extended reading on students' reading performance.

A portfolio checklist is designed to help students track their progress and improvement. The checklist includes sections for the vocabulary quizzes, reflection papers on their writings (sentences, paragraphs and essays), tests, extended reading evaluation sheets, glossary and presentation references, and any other activities. A new section will be developed for their e-stem reports.

D. Students' Grades:

The final grades for the students will be shared and analyzed in the final report as the course is still running.

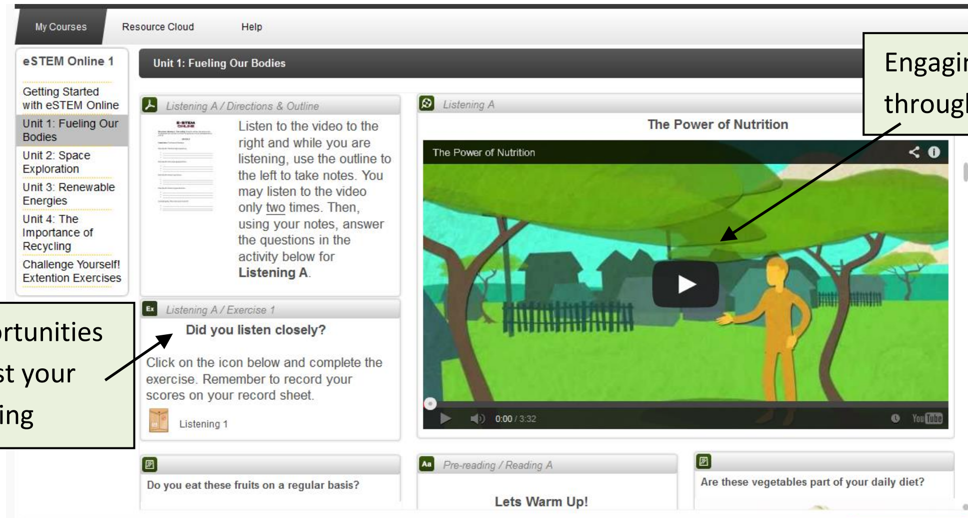
E. e-STEM online development

In response to student and teacher requests for more access to English content that addresses STEM themes, World Learning developed the first four pilot of units of guided, independent, on-line instruction. Designed to be accessible to teachers, staff and students, e-STEM online develops learners content knowledge and language skills simultaneously.

Topics for the pilot phase of development are drawn from STEM-subject related themes:

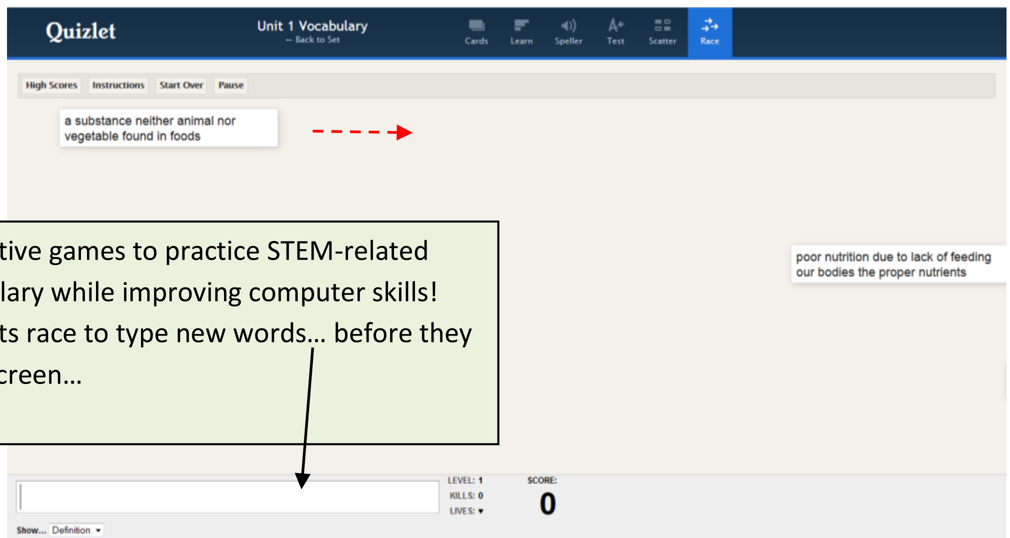
1. Fueling our bodies
2. Space exploration
3. Renewable energies
4. Recycling

Each unit provides interactive activities related to vocabulary development, writing, listening and reading. As illustrated below, material is designed to both interest students and engage them in further developing their academic skills.



Engaging topics through video

Opportunities to test your learning



Interactive games to practice STEM-related vocabulary while improving computer skills! Students race to type new words… before they leave screen…

Students working with a variety of text genre, and write about their findings..

These materials will be used during the academic year, reviewed and revised for roll-out to all STEM schools.

3. INSTRUCTORS STAFFING

This section presents information on the teachers' recruitment and staffing process in the ECASE English Language Intensive Summer Program for both teachers and students in 6th of October School and Ma'ady.

A. Intensive Program for Students:

Due to the large number of students in both schools, more instructors were in demand to teach for six classes for Ma'ady school students and seven classes for October school students. As the start date of the program has been rescheduled several times due to the current political situation, many teachers were unable to commit along course duration; two weeks. On the other hand, many of instructors who were previously ECASE ELP team members were also unable to join this program due to other work commitments and the start date short notice. The situation created a higher demand to hire more instructors. The following were the taken procedures in the staffing process:

B. Vacancies Announcement:

The announcement procedures took two directions; Posts and Word of Mouth. The announcement has been posted on Facebook teachers groups and communicated to colleagues in Egyptian teachers' communities at the American University in Cairo, the British University in Cairo, the Modern Sciences and Arts University in Cairo, as well as AMIDEAST, Cairo. In addition to the job requirements, the announcement included a brief description for the STEM schools in Egypt as funded by the USAID and implemented by the World Learning. It also included the program duration; two weeks. Additionally, the school location has been provided; 6th of October City, Giza and Zahraa Al Ma'ady, Ma'ady. Finally, the announcement included information about the required working hours per week/per section as well as the major job responsibilities; classroom teaching and assessments, curriculum and materials development, and staff meetings, marking sessions, and report writing. Interested applicants had to contact the program manager and e-mail their resumes.

C. Screening Resumes

The following step was reviewing the received applicants' resumes in terms of; academic credentials and professional experiences. The on line screening process was conducted by the program manager. The received resumes were 18 and the short listed were listed to 10 applicants who best met the job requirements. Consequently, the short listed applicants were notified with personal interviews appointments. The interviews were conducted by both the project manager and the HR associate in World English Cairo office. Each interview took 30 minutes in which the applicants were given a brief orientation about the competency based project, caliber of students, and program objectives. Later, the teachers introduced themselves, described their academic and professional experiences. The interviewers aimed at knowing the applicants areas of weaknesses and strengths. Some of the question tackled the applicant abilities to manage classes with multi levels of language proficiency.

Eventually; six instructors were shortlisted to work with 6th of October school students, and other six for Ma'ady school. All instructors, current and new, received orientation session for the program, materials, and course prior the training.

D. Intensive Program for Teachers:

The baseline tests resulted in the need for two classes for 6th of October school teachers; Intermediate and Basic. On the other hand, there was a need to run three classes for Ma'ady school teachers; two basic classes and one pre-intermediate one.

The instructors assigned for the five classes have joined the program earlier and used to teach for many of the current schools teachers during the second semester in the Academic year, 2012. The instructors' evaluation records were reviewed by the program director to ensure quality. All the instructors have prior experience teaching for adults, undergraduates, and training.

1. Ms. Marwa Fawzy Mahmoud

Ms. Marwa has a Bachelor of Arts in English Literature, 2004, School of Arts , Cairo University, Egypt, Preliminary masters year in Applied Linguistics, 2008, Cairo University, Egypt, and a Translation diploma, 2005-2006, Cairo University, Egypt.

Ms. Marwa is currently a Teaching Assistant at the British University in Egypt, English language Instructor at AMIDEAST Egypt, and an Academic English and Academic Writing Instructor at LLM program; Indiana University incorporation with Cairo University

2.Ms. Nesma Amir ElZahar

Ms. Nesma had her Teaching Knowledge Test (TKT): University of Cambridge, ESOL Examinations in 2011. She also had Pre-masters in English Applied Linguistics from Faculty of Arts, English Department, Cairo University, 2008.

Ms. Nesma currently works as an English Instructor, Linguistics Teaching Assistant & Program Leader of the intensive courses at Modern Sciences and Arts University (MSA). She is also a Freelance translator.

3. Ms. Summer Sabry

Ms. Summer has earned a Linguistics Diploma, 2005, Faculty of Arts, Cairo University

Ms. Summer had a Bachelor of Arts in English Literature, 2004, ranking third, Cairo University, Egypt. Currently, Ms. Summer works as English instructor at the British University in Egypt, AMIDEAST, the American University in Egypt, the German University in Cairo, and the Modern Science and Arts University.

4.Ms. Dina Gamal:

Ms. Dina had her FCE, CPE from the British Counsel, Cairo University. She also has a B A in Psychology from College of Arts. She had the PCETEFLA and the Professional Certificate in Written Translation & Certificate in Simultaneous Interpreting from the American University in Cairo, Centre for Adult. In 2002, Ms. Dina had the CELTA from the International Language Institute.

Currently, Ms. Dina works for Macmillan Egypt, as Teacher Trainer. She also works as Freelance Translator. Ms. Dina works in the British Council Teaching Material Bank, Material Writer, The British Council, Summer School Coordinator.

5.Mr. Sadek Onsi Hilal

Ms. Sadek graduated from the Faculty of Arts, English section, the department of Linguistics and Translation at Helwan University in 2000. had A Pre- Master in 2002 from Helwan University. In 2006, he got a two- year Translation Diploma at Cairo University. In 2012, he got a Professional Certificate in English Language Teaching (PCELT) provided by AMIDEAST and SIT World Learning.

Mr. Sadek has been in the teaching field since graduation that was in May 2000. Since 2001 he has started his career as a school teacher until 2007. He joined AMIDEAST, one of the most reputable educational institutions for training services. He has been participating in many educational programs for teaching mainly two different stages; teenagers and adults. I have been teaching in many programs and activities, such as the English Language Program, Conversation classes as well as ITP TOEFL.

All teachers received a detailed course and materials orientation prior the intensive summer classes start.

3. STUDENT ATTENDANCE

A. Teachers Classes

As it shows in the Average Attendance table below for Teachers classes in both October and Ma'ady Schools and the attached sheet in the appendix, the attendance was as high as anticipated.

October School	
Class	**Average Attendance %**
Basic	76%
Intermediate	77%

Ma'ady School	
Class	**Average Attendance %**
Basic	100%
Basic	88%
Intermediate	99%

The reasons believed to be behind the teachers' high attendance is that the convenient class times as the training took place during the Summer Break, which was previously requested by the teachers. During this time, the teachers had to be available at their schools on daily basis; however they had no work commitments. Therefore, the teachers were able to dedicate their efforts and time to the ELP classes.

B. Students Classes

The students' attendance was high as well during the intensive summer program. As the schools were boarder schools and the program took place in the week before the school starts and during the first week of school as well, the students were already available at the school and kept attending the classes regularly. During the program director and Academic manager class visits, the students showed their interest and motivation in learning English as they realize the impact of mastering English on their academic performance in the STEM schools. Another reason stands behind the students' high attendance is that by the time the intensive summer class took place, the students had no STEM courses load and were free of other classes assignments.

4. MONITORING AND EVALUATION FOR STUDENTS AND TEACHERS CLASSES:

A. Observations

Samples of observations and class visits are attached and analyzed (See Appendix C)

B. Student Mid Evaluation of the courses

October School and Al-Maady School

A mid evaluation for the English courses (Basic 1, Basic 2 and Pre-Intermediate) was conducted directly after the two weeks intensive course and in the second week of the regular evening English classes. The mid evaluation consists of five sections: course content, assessment, classroom communication, classroom management, and impact. It is based on a 5 point likret scale. The same evaluation form was used to conduct the final evaluation for the school teachers at the end of the three weeks intensive weeks during summer. School teachers who filled in the evaluation forms are those who joined the Basic and the Intermediate English levels. Teachers in both schools (October and Maady) filled in the final evaluation forms.

Both students and the school teachers in October school answered the evaluation within 10 minutes. The reason behind making it based on a likret scale is to give more validity and reliability for the findings and to be easy for the students, especially for the lower levels to express themselves rather than the evaluation forms with open-ended questions. However, one of the adjustments that will be done to the evaluation form is adding questions or comments space for students and school teachers to add additional comments. One of the strength of this evaluation is that it provides the Program with quantitative analysis and data to help assess and evaluate the progress of the English language courses. One of the weaknesses of the evaluation is that it did not provide the Program with qualitative data and analysis that could have helped add more sights into the performance of the English language program.

The total number of the students who took the mid evaluation in the Basic 1 level in the two schools is 103 students. The quantitative analysis for course content in the mid evaluation showed that most of the students choose option 1 (extremely well) for questions 1, 2 and 4. As for question 3, most of the students chose option 2 (very well). As for section 2 of the evaluation form “Assessment”, the quantitative analysis has shown that students have chosen options 1 (Extremely well) for questions 5 and 6. As for section 3 “Classroom Communication”, most of the students have chosen option 1 (Always) for questions 7 8, 9, 10, 11 and 12. As for section 4 of the evaluation form “Classroom Management”, most of the students have chosen option 1 (extremely well) for questions 13, 14 and 15. In the final section (section 5) “Impact”, most of the students have chosen option 1 (extremely well) for questions 16 and 20. As for questions 17 and 19, most of the students chose option 2 (very well). Students chose options 1 and 2 equally for question 18.

The total number of the students who took the mid evaluation in the Basic 2 level in the two schools is 83. The quantitative analysis for course content in the mid evaluation showed that most of the students choose option 1 (extremely well) for questions 2 and 3. As for question 1, most of the Basic 2 students chose option 2 (very well). Students chose options 1 and 2 equally for question 4. As for section 2 of the evaluation form “Assessment”, the quantitative analysis has shown that students have chosen options 1 (extremely well) for question 5 and 6. As for section 3 “Classroom Communication”, most of the students chose option 1 (extremely well) for questions 7, 8, 9, 10 and 12. As for question 11, Students chose options 1 and 2 equally. As for section 4 of the evaluation form “Classroom Management”, most of the students have chosen option 1 (extremely well) for questions 13, 14 and 15. As for section 5 “Impact”, most of the students have chosen option 2 (very well) for questions 17 and 19. Most of the students chose options 1 and 2 equally for questions 16 and 18. Most of the students chose option 1 (extremely well) for question 20.

The total number of the students who took the final evaluation in the Pre-Intermediate level in the two schools is 43. The quantitative analysis for the “course content” section in the final evaluation has shown that most of the students choose option 1 (extremely well) for questions 1, 3 and 4. Most of the students chose option 2 (very well) for question 2. As for section 2 of the evaluation form “Assessment”, the quantitative analysis has shown that students have chosen option 2 (very well) for questions 5 and 6. As for section 3, “Classroom Communication”, most of the students have chosen option 1 (extremely well) for questions 8, 9, 10 and 12. As for question 7, most of the students chose option 1 (extremely well) and option 2 (very well) equally. As for question 11, most of the students chose option 2 (very well). As for section 4 of the evaluation form “Classroom Management”, most of the students have chosen option 1 (Extremely well) for questions 14 and 15. As for question 13, most of the students chose option 1 (extremely well) and option 2 (very well) equally. As for section 5 “Impact”, most of the students have chosen option 1 (extremely well) for questions 16, 17 and

20. As for question 19, most of the students chose option 2 (very well) and options (1) and (2) equally for question 18.

C. Evaluation and Reports from Teachers on Students

Teachers were required to add and write comments and feedback on school teachers' performance in addition to the grades to help the English teachers of the course in the future assess schools teachers' needs. Samples are attached (See Appendix D).

D. School Teachers' Evaluation:

A. <u>School Teachers Final Evaluation of the Summer Intensive courses</u>

<u>October School and Al-Maady School</u>

A final evaluation for the English courses (lower Basic and Higher Basic) was conducted directly after the three weeks intensive course. The final evaluation consists of five sections: course content, assessment, classroom communication, classroom management, and impact. It is based on a 5 point likret scale. School teachers in both schools filled in the evaluation form.

School teachers in October and Maady schools answered the evaluation within 10 minutes. The reason behind making it based on a likret scale is to give more validity and reliability for the findings and to be easy for the teachers, especially for the lower levels to express themselves rather than the evaluation forms with open-ended questions. One of the adjustments that were done to the evaluation form is adding questions or comments space for school teachers to add additional comments. One of the strength of this evaluation is that it provides the Program with quantitative analysis and data to help assess and evaluate the progress of the English language courses.

The total number of the school teachers who took the final evaluation in the lower Basic level in the two schools is 22 school teachers. The quantitative analysis for course content in the final evaluation showed that most of the school teachers choose option 2 (very well) for questions 1 and 2. As for question 3, most of the school teachers chose option 3 (moderately well) and options 1 and 2 equally for question 4. As for section 2 of the evaluation form "Assessment", the quantitative analysis has shown that school teachers have chosen options 1 (Extremely well) for questions 6 and option 2 (very well) for question 5. As for section 3 "Classroom Communication", most of the school teachers have chosen option 1 (Always) for questions 7 8, 9, 10, 11 and 12. As for section 4 of the evaluation form “Classroom Management”, most of the school teachers have chosen option 1 (extremely well) for questions 14 and 15 and option 2 (very well) for question 13. In the final section (section 5) “Impact”, most of the school teachers have chosen option 2 (very well) for questions 16, 17, 18, 19 and 20.

The total number of the school teachers who took the final evaluation in the Higher Basic level in the two schools is 18. The quantitative analysis for course content in the final evaluation showed that most of the school students choose option 2 (very well) for questions 1 and 3. As for question 2, most of the Higher Basic school teachers chose option 1 (extremely well) and options 1 and 2 equally for question 4. As for section 2 of the evaluation form “Assessment”, the quantitative analysis has shown that school teachers have chosen options 2 (very well) for question 5 and 6. As for section 3 “Classroom Communication”, most of the school teachers chose option 1 (extremely well) for questions 7, 8, 9, 10 and 11. As for question 12, school teachers chose option 2 (very well) for question 12. As for section 4 of the evaluation form “Classroom Management”, most of the school teachers have chosen option 1 (extremely well) for questions 13, 14 and 15. As for section 5 “Impact”, most of the school teachers have chosen option 2 (very well) for questions 16, 17, 18, 19 and 20.

B. <u>Points of strength for the Basic level course offered to the Ts: (Maady School):</u>

1) The course is very good
2) The course has many good aspects. First of all, the course content help Ts quite a lot. For example, content helped them to improve their general English communication ability. Second, the teacher helped them to improve their weak areas by many ways.
3) The course helped them in listening by training everyday

<u>Points of Weakness for the Basic level course offered to the Ts: (Maady School):</u>

1) Ts want to learn how can they teach their subjects

<u>Points of strength for the Basic level course offered to the Ts: (October school):</u>

1) Slight change in the English performance

<u>Points of weakness for the Basic level course offered to the Ts: (October school):</u>

1)The course level is difficult

2)the course content should be addressing subjects other than science

3)The course time

4)taking an intensive course

5)the course should be addressing the teachers' needs

6)More activities on reading skills and essay writing

7) studying literature and stories related to those who are teaching Arabic

8) more communicative and speaking activities

Points of strength for the Intermediate level course offered to the Ts: (Maady school):

1)Ts learned many things from the course

2)nothing except many thanks

3)it is a wonderful experience

Points of weakness for the Intermediate level course offered to the Ts: (Maady school):

1)using more higher materials

2)the level of the readings during the sessions is not the same as in the quizzes

3) more exercises on reading skills

4)The Program needs to be aware of the curriculum of STEM to be integrated with the English courses

5)more tests on IELTS

6) More listening and speaking

7)Ts need a harder course

Points of strength for the Intermediate level course offered to the Ts: (October school):

1)The course gives Ts a chance to speak and correct themselves

2)The course is very interesting and valuable

3)The course helps them to improve their different English language skills

4)The course is amazing and improves their English language level

5)This course fits them

6)The course improved their levels as teachers in STEM. It added to their information and references

7)All the materials used match their needs. Materials chosen addresses perfectly their needs

8)Teachers hope to continue with the same level of materials of the course.

9)Listening tasks are very good as well as reading and writing. They learned how to write a paragraph in a different way and through new methods

10)Teachers practiced speaking perfectly and improved their fluency

11)The course is interesting and balance between all the skills

12)Teachers believe they achieve progress in reading

13)Teachers believe that each section in the course gives them a chance to improve their English language. Their vocabulary became more developed.

<u>Points of weakness for the Intermediate level course offered to the Ts: (October school):</u>

Respondents reported no weaknesses.

5. NEXT STEPS

During the next quarter, World Learning will continue to provide English language training to teachers and students. Activities will include the following:

1. After-school English Language Program for students with proficiency levels under 5.0, to prepare them to more effectively perform in content courses delivered in English language
2. Extensive reading program to develop academic skills of all learners
3. Foundational teacher training program for core English teachers
4. Implementation of e-STEM online, review, revision and further development
5. Intensive test-skills course for 3rd year students (October 6th) to prepare students for tests they'll be required to take for academic scholarships

Annex C: Annual Monitoring and Evaluation Report

Education Consortium for the Advancement of STEM in Egypt (ECASE)

CA No. AID 263-A-12-00005

Annual Monitoring and Evaluation Report

Year 1 (2012 – 2013)

World Learning leads the Education Consortium for the Advancement of STEM in Egypt (ECASE) project, a $25 million USAID-funded project to build a science, technology, and mathematics (STEM) model school network in Egypt. This four-year project will transform the current two pilot STEM schools into a collaborative STEM network that will serve as a catalyst for change not only for future STEM schools, but also for system-wide math and science education reform. The project will establish five STEM model schools throughout the country through comprehensive support to students, teachers, administrators, and key policy, private sector, and community stakeholders. The STEM Model Schools will serve as incubators for future leaders and innovators who will have the potential to advance at the forefront of research and development initiatives that fuel scientific invention and generate employment opportunities and economic growth. ECASE is implemented in partnership with The Franklin Institute (TFI), 21st Century Partnership for STEM Education (21PSTEM), and Teaching Institute for Excellence in STEM (TIES).

Key technical assistance will be provided under five broad objectives to:

- Increase student interest, participation, and achievement in science and mathematics, with special focus on underrepresented groups, such as girls and economically marginalized;
- Strengthen the STEM school initiative through developing an effective model for specialized high schools;
- Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning;
- Strengthen Egyptian Ministry of Education (MOE) capacity at the systems and policy level to sustain and replicate these model schools through Egypt; and
- Support the MOE in the upgrading of science and mathematics curriculum standards, student assessments, and teacher preparation for mainstream school.

The five objectives represent interwoven activities that lead to the overall program goal to improve access to education through the provision of science, technology, and mathematics education through extending equal opportunities to interested and qualified students.

Program Indicators and Targets

Indicators represent a particular characteristic or dimension of the results, and changes in an indicator over time show the extent to which the result is achieved. Each indicator has a performance baseline (basically the value of the indicator at the beginning of the planning or performance period) and one or more performance targets (the expected value of the indicator at the specific time in the future). Data on actual performance that is collected over time is compared to the targets to assess the program's progress. Projects may track two types of indicators, USAID Standard indicators and Custom indicators, although some projects may only track USAID Standard indicators.

1.1 USAID Standard Indicators and Custom Indicators

A detailed description for USAID Standard Indicators including indicator reference sheets, can be found in ADS 203. ECASE has included USAID Standard Indicators as outlined in the RFA for this project.

ECASE also reports on some indicators which are not USAID indicators. These custom, or project specific indicators, may or may not be included in the agreement. Targets for custom indicators are stated as life of project targets or set on an annual basis.

1.1.1 Indicator Reference Sheets

This PMP presents information on selected indicators in the form of Indicator Reference Sheets, as requested by USAID. In addition to a precise definition of each indicator (including the unit of measure, how data will be disaggregated and its management utility), the Indicator Reference Sheet also includes concise information on: the relationship of the indicator to the anticipated results; a plan for data collection (methods, sources, frequency, estimated cost, and responsible organizations or individuals); a plan for data analysis, reporting and review (method of analysis, presentation of data, review of data, and targeted reporting population); a discussion on data quality issues (dates for assessments, limitations, and actions taken to address limitations); information for the performance data table (method of calculation, notes on baseline and targets); other comments / information as relevant.

Monitoring and Evaluation in Year 1

Challenges and Resolutions

The ECASE project was awarded on August 28, 2013. In compliance with the terms of the cooperative agreement, World Learning submitted a draft Performance Monitoring and Evaluation Plan within 90 days of award (submitted on November 28, 2012). During the first year of implementation, ECASE and USAID engaged in continuous discussion to finalize the project PMP. Major milestones include the following submission and response dates and outcomes:

Document	Submission Date	Response Date	Outcome
Award data	USAID to WL August 28, 2012	WL to USAID August 29, 2012	CA # AID-263-A-12-00005 fully executed
Draft #1 ECASE PMP	WL to USAID November, 28, 2012	USAID to WL January 16, 2013	USAID responded with comments and suggested changes to PMP; USAID requested a "system to measure impact of the project" and a "control group to collect baselines pre and post USAID intervention"
WL Shared Responses with Consortium Partners	February 12, 2013		Feedback received and incorporated
ECASE Evaluation Design Options	March 18, 2013	Response through verbal discussion	Continued discussion
Draft #2 ECASE PMP	WL to USAID June 11, 2013	August 5, 2013	Followed up to get feedback on July 24, 2013
M&E Meeting in Cairo		USAID provided additional comments on September 3, 2013	Request on both sides for continued discussion

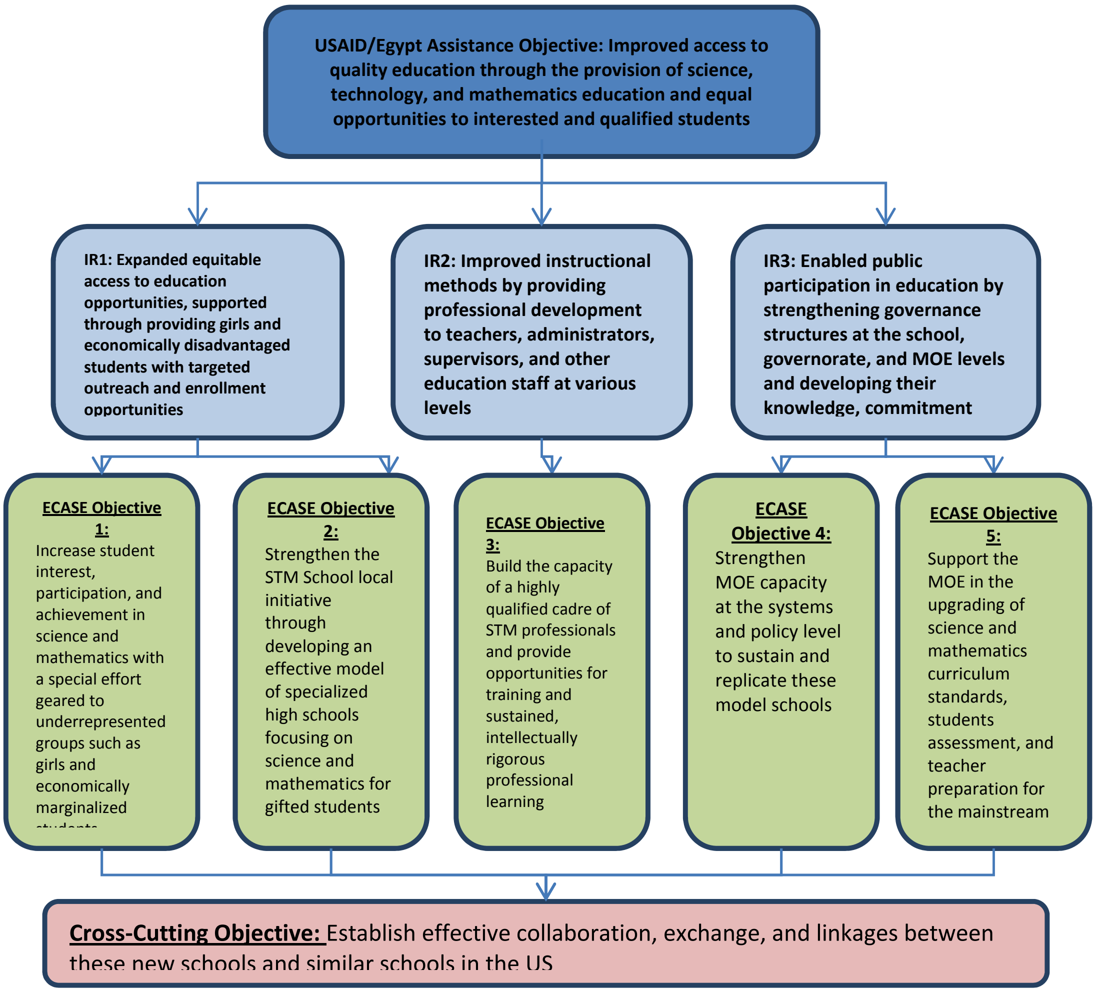
Following the final round of M&E discussions between ECASE and USAID, World Learning attempted to schedule meetings to seek final clarification and approval but the political and security situation in Egypt during the June-September 2013 made this difficult for all parties. As a result, ECASE ended Year 1 of implementation on September 30, 2013 without an approved PMP plan.

In addition to delays to PMP approval, there was substantial discussion between the project and USAID to clear up confusion in two key areas:

- Misunderstanding of how the ECASE project objectives contributed to the USAID Standard Outcomes and Intermediate Results; and
- USAID's request for a "control group to collect baseline data for pre and post USAID intervention"

ECASE Results and USAID/Egypt Standard Outcomes

World Learning and its partners responded to USAID's request for application and submitted a proposal to implement the STEM Model Schools Program on March 5, 2012. That RFA included standard outcomes and intermediate results based off USAID's education strategy. Since the project has been awarded, USAID/Egypt has issued a new strategy with altered assistance objectives. Yet, ECASE was designed and executed under the old strategy. This shift has caused USAID officials to fundamentally question the relationship between the ECASE project and the USAID/Egypt assistance objectives – despite the causal pathway described below mirroring the USAID/Egypt issued RFA for the program.



On page 3, Section 4 of the RFA (#263-10-000020), USAID states:
"4. Link to Strategic Plan and Results Framework
This program will support USAID/Egypt's Assistance Objective 22 -Improved Access to Quality Education – through provision of science and mathematics education and equal opportunities to interested and qualified students.

- *Intermediate Result 1 - Expanded equitable access to education opportunities: supported through providing girls and economically disadvantaged students with targeted outreach and enrollment opportunities.*
- *Intermediate Result 2 - Improved instructional methods: supported by providing professional development to teachers, administrators, supervisors, and other education staff at various levels.*

- *Intermediate Result 3* **-** *Enabled public participation in education: supported by strengthening governance structures, such as Boards of Trustees at the school level and Advisory Boards at the governorate and MOE levels, and developing their knowledge, commitment and advocacy skills regarding science and mathematics education."*

Furthermore, in Section 5 of the RFA, USAID outlines their expected objectives of the STEM School Project – language that ECASE mirrors directly in the ECASE project objectives. While the intermediate results (IRs) used in the RFA, as a result in the design and implementation of the project may be based on old USAID Education Strategy, the ECASE cooperative agreement was signed according to these IRs.

Challenges with Introducing a Control Group

During discussions of the project's PMP, there was a continued focus and request for ECASE to include a control group in the monitoring and evaluation system. This request was made this request after the project had been implementing activities in the two STEM Model schools for 5 months under this cooperative agreement (and for over 1.5 years of USAID support to the 6^{th} of October STEM School for Boys). ECASE is in continued discussion with USAID to detail how this request can be accommodated and while still maintain fidelity to the design of the program and assurance that monitoring data is valid and reliable.

World Learning presented detailed summary of evaluation designs that to be considered to be compliant with the USAID request on March 18, 2013. This summary included a recommendation on the most appropriate design and methodology given the considerable restraints to implementing the request. World Learning and USAID are in continued discussion about the specifics.

Reporting of Results

Results achieved during Year 1 are reporting in the Indicator Reference Sheets for each draft project indicator. Due to the challenges in Year 1 finalizing an approved PMP plan – all indicators are in draft form and are part of ongoing discussions with USAID to finalize indicators, indicators definitions and other information within the indicator reference sheets.

As such, the data presented in this Annual Monitoring and Evaluation Report is necessarily in draft form. Despite this, ECASE presents progress against draft targets for Year 1 of implementation to support the project and USAID's efforts to monitor progress and provide information for improved implementation.

Data is presented in the Actual row and further information is available on Year 1 progress in the additional comments section for each indicator.

Appendix A: Indicator Reference Sheets

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.1.1: Number of STEM model schools effectively using reformed admissions system based on fair and transparent student selection criteria

Unit: Number

Results Data	**FY 12-13**	**FY 13-14**	**FY 14-15**	**FY 15-16**	**TOTAL**
Targeted	**2**	**3**	**4**	**5**	**5**
Actual	--				

Indicator Description (Definition): ECASE staff will develop an admissions system that is transparent, inclusive, and criteria-based. This indicator measures the accumulative number of Model STEM Schools, totaling 5 that will open over the course of the project, will implement this new admissions system. The system will start to be implemented in academic year (2013-2014). All schools will continue to use the system for new admissions. New admission system will also include detailed admission data on students.

Data Source: Data from implementing partners and beneficiary schools including admissions system evaluation report and student admission records.

Rationale/Critical Assumptions for Indicator:
Clear, criteria-based admission system is essential to functional STEM schools that recruit and collect valuable student data. The timing and opening of STEM schools is determined by the MOE and outside the direct control of ECASE partners.

Schedule/Frequency of Data Collection: Annually; following school admissions cycle.

Responsible Officer: ECASE M&E Specialist

Method/Approach of Collection/Calculation: ECASE staff will analyze introduction of admissions system into each school verses accepted students, and will collect supplementary qualitative data (interviews and/or focus groups discussions with admissions boards) to ensure that the developed admission system is being effectively used.

Data limitation and Quality Assessments:

Timeliness of data may be limited by MOE's STEM Model school opening timelines.

Data Analysis/Dissemination Plan: ECASE will compile and report to USAID each year the cumulative list of STEM Schools achieving this performance indicator and the fiscal year in which that achievement is counted.

Other Donors in Sector:

Indicator's Relevance to Gender: Disaggregation of admissions student data by number of girls admitted to pilot STEM schools.

Additional Comments: Disaggregation of admissions student data also by number of students from socioeconomically marginalized communities and disability status.

Year 1 Progress: Selection criteria system was developed during Year 1 but the MOE did not adapt the system for student selection even though it was approved. The process needs to be delegated to the National STEM Board.

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.2.2.1a: Number of outreach events held for established Board of Trustees with school administrators.

Unit: Number

Results Data	**FY 12-13**	**FY 13-14**	**FY 14-15**	**FY 15-16**	**TOTAL**
Targeted	**2**	**3**	**4**	**5**	**14**

Actual	--				

Indicator Description (Definition): School-based Board Of Trustees (BOT) is association of parents who are involved in school management. Each school will have its own Board Of Trustees with mandated roles in school governance. ECASE will hold several outreach events to orient BOTs and school administrators on "effective Engagement between BOT and STEM Schools". BOT members will have a major role to link students' parents to the school and inform the parents of the school activities. This will let them invite other parents to enroll their children. The indicator measures the number of outreach events for each STEM school over the project life.

Data Source: Data from implementing partners (TIES) and beneficiary schools including BOT registration sheets, meeting notes and ECASE project records via project database.

Rationale/ Critical Assumptions for Indicator:
Parents initially enroll their students because it is a new school that provides a better education to their children. They need to be involved with the school and its activities to learn about the STEM education that is provided to the students. Thus parents will be much more convinced with the school and its impact on the students. Parents will be willing and able to participate in Board of Trustees.

Schedule/Frequency of Data Collection: Annually

Method/Approach of Collection/Calculation:
ECASE staff will obtain, compile and analyze file copies of attendance and participant for each specific event.

Responsible Officer: ECASE M&E Specialist

Data limitation and Quality Assessments:
Timeliness of data may be limited by MOE's STEM Model school opening timelines.

Data Analysis/Dissemination Plan: ECASE will compile and report to USAID each year the cumulative list of events. No additional analysis by USAID or dissemination is required.

Other Donors in Sector:

Indicator's Relevance to Gender: Boards of Trustees will include both male and female members.

Additional Comments:

Year 1 Progress: During April 2013, training of the parent boards from both Ma'adi and 6th of October schools was planned. However, the training was canceled due to student protests ongoing in April 2013 in both schools. In addition, the parents' board at Ma'adi had been dissolved.

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.2.2.1b: % of Boards of Trustees (BOTs) engaged with school administrators in relevant school level decision-making.

Unit: Percentage

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	------	15%	30%	50%	80%
Actual	------				

Indicator Description (Definition): ECASE project will orient STEM BOT and school administrators at each school on effective engagement between BOT and STEM Schools. All BOTs will engage with school administrators in relevant school-level decision-making Forms of BOT engagement with school administrators may include advisement, discussion or collaborative meeting on school issues (including school planning) that expect a decision before action may be taken.

Data Source: Data from implementing partners (TIES) and beneficiary schools including BOT registration sheets, meeting notes, and ECASE project records via a project database.

Rationale/ Critical Assumptions for Indicator:
The indicator is consistent with the MOE mandate that school Boards of Trustees participate actively with school administration in school-level decision-making appropriate to BOT engagement. The indicator assumes that: i) the BOT for each STEM school will be active, capable and prepared to engage with school administrators, and ii) the school principal in each STEM school will accept BOT engagement in school decision-making.

Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist	**Method/Approach of Collection/Calculation**: The Denominator will be no. of decision taken on the school level and the nominator will be no. of these decisions that BOT was involved or engaged. Only BOTs in ECASE STEM schools will be counted and no Board will be counted more than once towards the achievement of this performance indicator. A minimum of three (3) instances of BOT engagement with STEM school administrators must be documented for each school to be counted as achieving this result.
Data limitation and Quality Assessments: BOT meeting minutes must identify the school administration personnel and BOT members participating in each instance of BOT engagement (advisement, discussion, negotiation) with school administrators in relevant school decision-making.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of Board of Trustees achieving this performance indicator and the fiscal year in which that achievement is counted. **Other Donors in Sector:**
Indicator's Relevance to Gender: Boards of Trustees will include both male and female members.	
Additional Comments:	

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.3a: Number of students receiving Intensive Academic English Program training
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**350**	**500**	**1000**	**1800**	**3650**
Actual	**565 (343 boys, 222 girls)**				

Indicator Description (Definition): Students who rate below the CEFR B1 (IELTS 5.0) will be enrolled in the intensive Academic English Program (I-AEP), a 6-8 week intensive course of highly interactive and enriching study, before being admitted to STEM schools. If students in the I-AEP pass the exit exam (achieve a CEFR B1/IELTS 5.0), they will be admitted to STEM schools with the other students. If the students do not reach the required band following participation in the I-AEP, but show significant improvement, they will be admitted to the STEM school on the condition that they take four hours per week of after-school supplementary English language classes.

Data Source: Data from implementing partners and beneficiary schools including attendance sheets, training registration sheets, and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** Student English language proficiency levels vary greatly; some learners entered the school with a higher level of English than their teachers, while others enrolled with a very limited ability to use or comprehend the language in an academic setting. Reaching total targeted student numbers depends upon this variation and total school enrollment, which is outside the remit of ECASE partners. ECASE assumes that access to intensive English courses will improve student proficiency and thus their ability to be successful in learning STEM content.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** M&E Specialist	**Method/Approach of Collection/Calculation**: Total number of students is calculated by the direct counting of the number of unique students participating in I-AEP.

Data limitation and Quality Assessments: ECASE will ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of students achieving this performance indicator and the fiscal year in which that achievement is counted **Other Donors in Sector:** Previous training by British Council.
Indicator's Relevance to <u>Gender</u>: Disaggregation of student data by number of girls receiving training.	
Additional Comments: Disaggregation of participant data by number of students from school, socioeconomically marginalized communities and disability status. **Year 1 Progress: ECASE project trained 343 students in the 6th of October School and 222 students in Maadi School. The number is over the estimated target because ECASE provided summer training for new students to improve their English language skills in order for them to able to function in an English-medium school.**	

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.3b: Increase in student level in English language proficiency

Unit: Mean score mapped to CEFR and IELT

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**N/A**	**N/A**	Minimum CEFR band level of B1 (IELTS 5.0)	Minimum CEFR band level of B1 (IELTS 5.0)	Minimum CEFR band level of B1 (IELTS 5.0)
Actual	**6th of October (boys):** students averaged an overall CEFR of A2 (IELTS 4.2). **Maadi (girls):** students averaged an overall CEFR of A2+ (IELTS 4.3)				

Indicator Description (Definition): Students' proficiency levels are defined by their scores on the project English Language Assessment (mapped to the internationally recognized IELT and CEFR) that is administered prior to their matriculation into STEM schools. If the students do not reach the required band following participation in the I-AEP, but show significant improvement, they will be admitted to the STEM school on the condition that they take four hours per week of after-school supplementary English language classes (the Extensive Academic English Program – E-AEP). Students will not be permitted to engage in other extracurricular activities until the requisite English proficiency level is reached.	
Data Source: Data from implementing partners (World Learning) and beneficiary schools including English proficiency test scores and observation rubrics, kept in ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** Student English language proficiency levels vary greatly; some learners entered the school with a higher level of English than their teachers, while others enrolled with a very limited ability to use or comprehend the language in an academic setting. Reaching total targeted student numbers depends upon this variation and total school enrollment, which is outside the remit of ECASE partners. ECASE assumes that access to intensive English courses will improve student proficiency and thus their ability to be successful in learning STEM content.
Schedule/Frequency of Data Collection: Annually; post-testing **Responsible Officer:** ECASE M&E Specialist, WL English Language Specialists	**Method/Approach of Collection/Calculation**: Improvement is calculated by comparing the difference between pre and post tests. Differences in mean scores will be analyzed to test statistical significance.

Data limitation and Quality Assessments: Level of improvement can be attributed to other non-project related factors that are beyond project control. ECASE will also work to ensure data quality by reducing measurement error by using internationally accepted assessment instruments and training enumerators how to administer them.	**Data Analysis/Dissemination Plan:** WL will assess each student before their matriculation into STEM schools and will assess each student after completion of their intensive program, as applicable. The proficiency levels of individual STEM school students will be carefully assessed and mapped to both the International English Language Testing System (IELT) and Common European Framework Reference (CEFR) and reported by WL. The CEFR scale ranges from A1 (basic user) to C2 (proficient user). The IELTS language proficiency band levels range from 1 (non-user) to 9 (expert user). Students should have a minimum CEFR band level of B1 (IELTS 5.0) to perform in an English-medium academic setting. ECASE will report data to USAID in its annual reports and as standalone internal evaluation reports.
	Other Donors in Sector: Previous training in schools by British Council
Indicator's Relevance to <u>Gender</u>: Disaggregation of student data by number of girls receiving training.	
Additional Comments: Disaggregation of participant data by number of students from socioeconomically marginalized communities and disability status. Mean scores will also be disaggregated by school.	

ECASE Objective 1: Increase student interest, participation, and achievement in science and mathematics with special effort to underrepresented groups such as girls and economically marginalized students

Performance Indicator # 1.3.3: Percentage of students achieving minimum passing STEM school exit grade

Unit: percentage

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	Total
Targeted	**NA**	**80%**	**85%**	**90%**	**NA**
Actual	**NA**				

Indicator Description (Definition): Improvements in students' learning outcomes in science and mathematics education are one of the ECASE project's targets. ECASE is working with MOE to develop and finalize the assessment methodology in the final year. This methodology will be implemented starting from academic year 2013-2014 for the first graduation group. This indicator will calculate the percentage of students achieving minimum passing STEM school exit grade

Data Source: Data from implementing partners (21PSTEM) and beneficiary schools including test scores and observation rubrics, kept in ECASE project records via a project database.		**Rationale/ Critical Assumptions for Indicator:** None.
Schedule/Frequency of Data Collection: Annually		**Method/Approach of Collection/Calculation**: Percentage is calculated by comparing number of students achieving minimum passing grades 60% to the total number of students
Responsible Officer: M&E Specialist		
Data limitation and Quality Assessments: Level of improvement can be attributed to other non-project related factors that are beyond project control.		**Data Analysis/Dissemination Plan:** ECASE will report data to USAID in its annual reports and as standalone internal evaluation reports.
		Other Donors in Sector:
Indicator's Relevance to <u>Gender</u>: Data will be disaggregated by gender		
Additional Comments:		

ECASE Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students

Performance Indicator # 2.2.3: Number of science/Fab labs equipped through direct procurement
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**3**	**4**	**1**		**8**
Actual	**3**				

Indicator Description (Definition): ECASE will equip schools with the necessary resources and infrastructure to support experiential classroom activities in STEM. Science labs and/or Fab Labs will be included for procurement, as identified and necessary. During the first year ECASE will procure 1 Fab Lab for both Ma'adi and 6th of October schools and Science lab equipment for Ma'adi. The project plans to provide 1 more Fab Lab to a newly opened school (to be determined by MOE) and additional equipment for science labs in each of the new schools (4).

Data Source: Data from partner implementing organizations; ECASE project and inventory records including procurement records of competitive bid processes, vendor/product evaluations, receipts/invoices.

Rationale/ Critical Assumptions for Indicator: This indicator assumes that experiential learning techniques will be better implemented with the necessary science and math resources. Training will also be provided to each school on how to maintain these resources. ECASE assumes provision of an average of 4 science/computer labs per school but this will dependent on the needs based on other donor activity.

Schedule/Frequency of Data Collection: Quarterly, but ECASE will maintain a register of all resources and update this as new resources are procured.

Responsible Officer: Chief of Party/ECASE M&E Specialist/Procurement Manager

Method/Approach of Collection/Calculation: ECASE staff will be responsible to verify and document the delivery and installation of furniture and equipment in supported schools, and maintain document files for verification.

Data limitation and Quality Assessments:

Verifying documentation for the project's procurements will be photocopies of the original receipt-of-delivery documents signed and stamped by the school administration. This documentation will be obtained and filed at ECASE offices. In the absence of verifying documentation, ECASE will accept digital photographs of every supplied lab.

Data Analysis/Dissemination Plan:

ECASE will report data to USAID.

Other Donors in Sector:

Indicator's Relevance to Gender: None.

Additional Comments:

Year 1 Progress: ECASE procured and installed Fab Lab equipment for Maadi and 6th of October and Science Lab for equipment for the Maadi school.

ECASE Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students

Performance Indicator # 2.3.1: Number of Public-Private Partnerships (PPPs) or other partnerships implemented
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**
Actual	**9**				

Indicator Description (Definition): Public-private partnerships (PPPs) will be identified through the ECASE to create sustainable and mutually beneficial relationships between the school and community. One of ECASE Project activities is creating sustainable and mutually beneficial PPP and monthly track this list. This indicator will count the number of PPPs implemented.

Data Source: Data from implementing partners (TIES) including School PPP portfolios, site visit reports, and PPP surveys and questionnaires, kept in ECASE project records	**Rationale/ Critical Assumptions for Indicator:** PPPs with STEM schools will support their innovation and sustainability in the community. ECASE assumes that private partners will be willing and able to contribute to ECASE STEM schools and associated activities. The willing participation of Egyptian community stakeholders is a prerequisite for developing PPPs, as is the number of potential partners available in a community.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist / PPP Specialist	**Method/Approach of Collection/Calculation**: Calculated by direct counting of PPPs. Survey and questionnaire and site visit data will be analyzed for patterns, trends, and contextual factors that affect sustainable partnership with communities and will be utilized to improve the project approach to PPPs.
Data limitation and Quality Assessments: Data quality could be limited by self-report data from partners through questionnaires/surveys.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of PPPs achieving this performance indicator and the fiscal year in which that achievement is counted. **Other Donors in Sector:**

Indicator's Relevance to Gender: N/A
Additional Comments: **Year 1 Progress: Companies supporting the schools currently include: IBM, Intel, Samsung, Dow, Cisco, Microsoft and Google. World Learning has also arranged for cost savings from the textbook publishers for the new curriculum and Fab Lab Foundation.**

ECASE Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students

Performance Indicator # 2.3.2: Value of in-kind and/or financial contributions towards project goal.
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**TBD**	**TBD**	**TBD**	**TBD**	**$5 million (as per cooperative agreement)**
Actual	**TBD**				

Indicator Description (Definition): Financial and/or in-kind assistance is defined as the amount of resources (whether in cash or in-kind) donated to support STEM Model schools through PPPs. ECASE project's goal is 10% of the project contract. This indicator will measure the accumulative donation through the life of the project.

Data Source: Data from implementing partners (TIES) including School PPP portfolios, site visit reports, and PPP surveys and questionnaires, kept in ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** PPPs with STEM schools will support their innovation and sustainability in the community. ECASE assumes that private partners will be willing and able to contribute to ECASE STEM schools and associated activities. The willing participation of Egyptian community stakeholders is a prerequisite for developing PPPs, as is the number of potential partners available in a community.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist/ PPP Specialist	**Method/Approach of Collection/Calculation**: Calculated by direct calculation of contributions financial and converting in-kind to financial amount according to market value with documentation.

Data limitation and Quality Assessments: Data quality could be limited by self-report data from partners through questionnaires/surveys.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative amount of financial and in-kind of PPPs contribution for achieving this performance indicator and the fiscal year in which that achievement is counted. **Other Donors in Sector:**
Indicator's Relevance to <u>Gender</u>: None	
Additional Comments: **Year 1 Progress: ECASE established relationships with 9 PPP in Year 1 but is designing and implementing system to calculate the monetary value of in-kind contributions and collect supporting documentation from private partners. Before reporting data, ECASE wants to ensure that data is in absolute compliance with USAID rules and regulations. Data for this indicator will be reported in the next quarterly report.**	

ECASE Objective 2: Strengthen the STEM School local initiative through developing an effective model of specialized high schools focusing on science, technology, and mathematics for gifted students

Performance Indicator # 2.4.1: Number of extra-curricular activities organized to complement classroom content and school specialization.

Unit: Number

Results Data	**FY 12-13**	**FY 13-14**	**FY 14-15**	**FY 15-16**	**TOTAL**
Targeted	**1**	**2**	**2**	**2**	**7**
Actual	**1**				

Indicator Description (Definition): STEM model school teachers will be trained in delivering mini-courses which complement classroom content and school specializations. In collaboration with scientists and educators from a network of university partners, ECASE will support these project-based after school programmatic elements to extend the inquiry-based science instruction and programming outside the classroom. ECASE may modify, substitute or propose additional qualifying courses for teachers as appropriate to support the project's professional development strategy.

Data Source: Data from implementing partners (TFI, TIES) including attendance sheets, training registration sheets, and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** Mini-courses provide in-depth content knowledge in STEM subjects to supplement regular classroom curriculum. After being trained, teachers will then be expected to deliver these mini-courses to students that elect to participate.
Schedule/Frequency of Data Collection: Annually; following the event. **Responsible Officer:** ECASE M&E Specialist	**Method/Approach of Collection/Calculation**: Participant and training event data is collected by the trainer of each event directly from trainees and submitted to ECASE staff for review and data entry into the project database. Project results data will be documented with a complete list, maintained at ECASE HQ, of all qualifying trainees.
Data limitation and Quality Assessments: Some teachers, who are expected to receive refresher trainings, will no longer be teaching at the original school. No trainee will be counted more than once, regardless of the number of ECASE trainings completed.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the number of events and list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted. **Other Donors in Sector:**
Indicator's Relevance to <u>Gender</u>: Data will be disaggregated by gender.	

Additional Comments:

Year 1 Progress: ECASE project organized 32 field-trips (1 category of extra-curricular activity) for the students in both schools to Fab Lab Egypt, Smart Village and other trips that helped the students in their Capstone projects.

ECASE Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

Performance Indicator # 3.1.1: Number of teachers and administrators trained on Professional Development
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**60**	**80**	**120**	**150**	**420**
Actual	**96**				

Indicator Description (Definition): ECASE will train teachers in STEM schools on Professional Development during teacher breaks (4 weeks per year-2 two weeks sessions), with refresher training during the school year. These trainings will help teachers implement STEM curriculum in the classroom. Trainings will cover fundamental principles of project-based learning, STEM content areas, and English Language in Math and Science classrooms training. ECASE may modify, substitute or propose additional qualifying courses for teachers as appropriate to support the project's professional development strategy.

Data Source: Data from implementing partners and beneficiary schools including attendance sheets, training registration sheets, and ECASE project records via a project database.

Rationale/ Critical Assumptions for Indicator: ECASE's training best practices are identified as ways to improve the quality of teaching and learning in STEM schools. ECASE assumes that 30 teachers are employed at each school, yet some schools experience underemployment which may inhibit ECASE reaching its targets. Targets increase each year as new STEM schools are opened. Additionally, some teachers, who are expected to receive refresher trainings, will no longer be teaching at the original school, so application of knowledge may be limited. Currently, Egyptian STEM schools do not have a full cohort of administration staff, only one lead administrator each – the principal.

Schedule/Frequency of Data Collection: Annually; quarterly; following trainings.

Responsible Officer: ECASE M&E Specialist

Method/Approach of Collection/Calculation: Attendance data is collected by the trainer responsible for each event directly from trainees and submitted to ECASE staff for review and data entry into the project database. Project results data will be documented with a complete list, maintained at ECASE HQ, of all qualifying trainees. Total number of trainees is calculated by the direct counting of the number of unique participants in each type of training. Numbers will be reported in aggregate. Total number of teachers and administrators is calculated by the direct counting of the number of unique teachers and administrators participating in best practices trainings.

Data limitation and Quality Assessments:

ECASE will ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records.

Data Analysis/Dissemination Plan:

ECASE will compile and report to USAID each year the cumulative list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted.

Other Donors in Sector:

Indicator's Relevance to Gender: Data will be disaggregated by gender.

Additional Comments: For the English courses, the proficiency levels of STEM school teachers will be carefully assessed and mapped to both the International English Language Testing System (IELT) and Common European Framework Reference (CEFR) and reported by WL. The CEFR scale ranges from A1 (basic user) to C2 (proficient user). The IELTS language proficiency band levels range from 1 (non user) to 9 (expert user). It is recommended that teachers have a minimum CEFR level of B2- (IELTS 6.0) to deliver instruction in English. Teachers will be required to take an English language proficiency test and achieve a minimum CEFR band of B1 (IELTS 5.0) to be eligible to teach in STEM schools. STEM content teachers that meet the above-mentioned English language benchmark and are selected for employment in the STEM schools will still receive limited English language support through TELIC training and online support to help them adapt to the content and methodology inherent to STEM education. Data will also be disaggregated by school.

Year 1 Progress: ECASE project trained 61 individual teachers and administrators in Ma'adi and October Schools, plus 35 teachers trained but not hired or trained and left the schools.

ECASE Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

Performance Indicator # 3.1.2: Percentage of teachers implementing the developed STEM curriculum.

Unit: Percentage

Results Data	**FY 12-13**	**FY 13-14**	**FY 14-15**	**FY 15-16**	**TOTAL**
Targeted	**NA**	**50%**	**65%**	**75%**	**75%**
Actual	**NA**				

Indicator Description (Definition): ECASE supports the development of school-based curriculum to enable teachers to create project-based learning environments that facilitate STEM education. ECASE project will implement the new curriculum (Ver. 1.0) in academic year 2013-2014. This indicator investigates the extent to which teachers are implementing best practices in the classroom. The percentage will be dependent upon the level of implementation of best practices in the classroom.

Data Source: Data from implementing partners and beneficiary schools including attendance sheets, training registration sheets, and ECASE project records via a project database.

Rationale/ Critical Assumptions for Indicator: ECASE project developed Classroom observation tool to track teachers' performance.

Schedule/Frequency of Data Collection: Annually

Responsible Officer: ECASE M&E Officer, Deputy Chief of Party

Method/Approach of Collection/Calculation: Assessing quality of implementation will be through ECASE classroom observation tool and teachers readiness survey. Percentage will be calculated by dividing the number of trained teachers implementing curriculum or best practices (numerator) by the total number of teachers trained (denominator).

Data limitation and Quality Assessments:

Some teachers, who are expected to receive refresher trainings, will no longer be teaching at the original school, so total percentages may not reflect consistency in those trained and those assessed. Validity of data can be limited depending upon reliability of the evaluator. ECASE will ensure the proper training of evaluators in proper use of assessment tools to avoid measurement error.

Data Analysis/Dissemination Plan:

ECASE partners will analyze data to both inform teacher curriculum and material design and to assess the extent to which teachers are implementing STEM Best Practices training content in their classrooms. The data will be used for both formative and summative purposes. ECASE will report data to USAID in its annual reports and as standalone internal evaluation reports. -

Other Donors in Sector:

Indicator's Relevance to Gender: Data will be disaggregated by gender.

Additional Comments: Data will also be disaggregated by school and by the type of assessment, i.e. best practices or type of curriculum.

ECASE Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

Performance Indicator # 3.4.1: Number of senior school managers and relevant MOE officials trained in Whole School Change Management
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**20**	**20**	**30**	**30**	**100**
Actual	**4**				

Indicator Description (Definition): ECASE will train 25 (5 per model school) senior school managers and relevant MOE officials in Whole School Change Management which will build school principals' ability to develop and implement strategic STEM action planning frameworks. In Year 1, 5 from each of the two STEM schools will be trained in addition to 10 MOE officials. Starting in Year 3, two-three new STEM schools will be open so target number increase. As part of these trainings, administrators will also participate in online training forums, video conferencing, yearly retreats, and partnerships with U.S. STEM professionals.

Data Source: Data from implementing partners (TFI, TIES) and beneficiary schools including attendance sheets, training registration sheets, MAP results, and ECASE project records via a project database.

Rationale/ Critical Assumptions for Indicator: Whole School Change Management provides ongoing support to school leaders, administrators and MOE to strengthen school management and governance, necessary for the success of fully functional and independent STEM schools. This activity also assumes regular internet access for distance partnerships with content and U.S. based practitioners.

Schedule/Frequency of Data Collection: Annually; following trainings.

Responsible Officer: ECASE M&E Specialist

Method/Approach of Collection/Calculation: Attendance data is collected by the trainer responsible for each event directly from trainees and submitted to ECASE staff for review and data entry into the project database. Project results data will be documented with a complete list, maintained at ECASE HQ, of all qualifying trainees. Total number of administrators is calculated by the direct counting of the number of unique administrators participating in Whole School Change Management Trainings. MAP (Management Assessment Protocol) will be used as appropriate.

Data limitation and Quality Assessments:
The objectivity of self-report data from school administrators can be limited. ECASE will also ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records.

Data Analysis/Dissemination Plan:
ECASE will compile and report to USAID each year the cumulative list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted. -.

Other Donors in Sector:

Indicator's Relevance to Gender: Data will be disaggregated by gender.

Additional Comments: Data will also be disaggregated by school.

Year 1 Progress: Due to the political unrest and changing management in school leadership this training was delivered twice for the school principals only. Three female principals and one male.

ECASE Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

Performance Indicator # 3.5.1: Percentage of Master Trainers demonstrating best practices in training for STEM schools
Unit: Percentage

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**NA**	**50%**	**65%**	**75%**	**75%**
Actual	**NA**				

Indicator Description (Definition): Up to 100 Master Trainers will be trained in best practices in training who will then identify and build the capacity of teacher trainers. ECASE staff will assess the extent to which Master Trainers are demonstrating best practices in training. This activity will start in Year 2.

Data Source: Data from implementing partners and beneficiary schools including attendance sheets, training registration sheets, and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** ECASE assumes that if Master trainers are fully demonstrating best practices in their training, then the capacity of the teachers receiving training throughout the program will improve. ECASE also assumes that after being assessed, master trainers will fully implement the content gained through ECASE training in their own training practice.
Schedule/Frequency of Data Collection: Annually; following trainings. **Responsible Officer:** ECASE M&E Specialist	**Method/Approach of Collection/Calculation**: Various means of assessing quality of best practices training will be employed to triangulate data and ensure objectivity of best practice evaluation including: online post/visits to discussion sites, teacher observation reports, and Youth Truth Surveys. Percentage will be calculated by dividing the number of trained teachers implementing curriculum (numerator) by the total number of teachers trained (denominator).
Data limitation and Quality Assessments: Validity of data can be limited depending upon reliability of the evaluator who uses the various data collection tools to evaluate teacher performance. ECASE will ensure the thorough training of evaluators in proper use of assessment tools to reduce measurement error. ECASE will also ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted. . **Other Donors in Sector:**
Indicator's Relevance to Gender: None.	
Additional Comments:	

ECASE Objective 3: Build the capacity of a highly qualified cadre of STEM professionals and provide opportunities for training and sustained, intellectually rigorous professional learning

Performance Indicator # 3.6.1: Number of teachers using virtual learning platforms

Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**20**	**45**	**60**	**75**	**75**
Actual	**27**				

Indicator Description (Definition): Virtual learning platforms will be employed by ECASE to develop relationships between U.S. and Egyptian teachers and develop mentorship/coaching opportunities. This indicator will measure accumulative number of teachers using virtual learning platforms.	
Data Source: Data from implementing partners (TIES) and beneficiary schools including project records and online tracking of site visits, documents uploaded, and learning modules accessed. Data will be recorded in ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** The use of virtual learning platforms will increase teachers' access to information and develop partnerships with US counterparts. This activity assumes regular internet access.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist, ECASE STEM Specialist	**Method/Approach of Collection/Calculation**: Data includes - counting the unique number of users accessing virtual learning platforms developed by ECASE, including STEM teachers and administrators. Now teachers are using Google apps, project will count number of users using this application to submit their work. However if other applications will be used, the log to this application will be used.

Data limitation and Quality Assessments: Data quality may be limited by accessibility of internet for development, maintenance, and tracking of online tools. ECASE will ensure that the total number of participants are unique individuals and are not double counted by cross-checking ECASE project records.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted. .
	Other Donors in Sector:
Indicator's Relevance to Gender: None	
Additional Comments: Data will also be disaggregated by school. **Year 1 Progress: Due to the political situation most of the teachers use Gotomeeting and Google drive to coordinate with trainers in the US. The actual numbers reported includes Science and Math teachers only, since those content areas are the focus of trainings.**	

ECASE Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate model schools

Performance Indicator # 4.2.1: Number of NCEEE and MOE officials trained in STEM assessment development
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**20**	**10**	**10**	**10**	**50**
Actual	**15**				

Indicator Description (Definition): NCEEE and MOE Officials will be trained on appropriate formative and summative STEM assessments to be used in Egyptian STEM Model schools.

Data Source: Data from partner implementing organization (21PSTEM), including attendance sheets, training registration sheets, and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** To achieve success in ECASE assumes sustained MOE participation in ECASE objectives. In the first year of the project, NCEEE and MOE officials will undertake a comprehensive training, in subsequent years targeted training will be done with relevant government officials.
Schedule/Frequency of Data Collection: Annually; following training. **Responsible Officer:** ECASE M&E Specialist	**Method/Approach of Collection/Calculation**: Attendance data is collected by the trainer responsible for each event directly from trainees and submitted to ECASE staff for review and data entry into the project database. Project results data will be documented with a complete list, maintained at ECASE HQ, of all qualifying trainees. Total number of staff is calculated by the direct counting of the number of staff members participating in STEM assessment development training.
Data limitation and Quality Assessments: ECASE will ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of beneficiaries achieving this performance indicator and the fiscal year in which that achievement is counted.
	Other Donors in Sector:
Indicator's Relevance to Gender: Data will be disaggregated by gender.	
Additional Comments: **Year 1 Progress: Two sessions were held on Survey Enacted Curriculum.**	

ECASE Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate model schools

Performance Indicator # 4.2.2: Number of assessment instruments adapted and implemented by the MOE
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**0**	**1**	**0**	**0**	**1**
Actual					

Indicator Description (Definition): Summative instrument(s) will be adapted from internationally recognized assessments (i.e. PISA, TIMSS, ACT, etc) and utilized by the Egyptian MOE to evaluate graduation for students from STEM Model schools. This will be the STEM school equivalent of the thanaweya amma exam, and is a considerable undertaken for both the project and the MOE.

Data Source: Data from partner implementing organization (21PSTEM), including attendance sheets, training registration sheets, and ECASE project records via a project database, as well as MOE documents.

Rationale/ Critical Assumptions for Indicator: To achieve success in ECASE assumes sustained MOE participation in ECASE objectives.

Schedule/Frequency of Data Collection: Annually

Responsible Officer: ECASE M&E Officer

Method/Approach of Collection/Calculation: Calculated by direct counting of assessment instruments and analyzing MOE policy documents.

Data limitation and Quality Assessments:

Timeliness of data depends upon MOE staff availability.

Data Analysis/Dissemination Plan:

ECASE will compile and report to USAID each year the cumulative list of instruments achieving this performance indicator and the fiscal year in which that achievement is counted.

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Other Donors in Sector:

Indicator's Relevance to <u>Gender</u>: N/A

Additional Comments:

Year 1 Progress: ECASE has been working on the creation of an appropriate summative assessment instrument to serve as a secondary school exit exam for students graduating from STEM model schools. Significant progress on research and tool creation has been made and the tool is expected to be implemented for student graduating from the 6th of October STEM school in May 2014.

ECASE Objective 4: Strengthen MOE capacity at the systems and policy level to sustain and replicate model schools

Performance Indicator # 4.3.1: Number of U.S.-Egypt professional collaborations through National STEM board that support ECASE objectives.
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**TBD**	**TBD**	**TBD**	**TBD**	**TBD**
Actual					

Indicator Description (Definition): To build the capacity of the National STEM Board, ECASE will engage in U.S.-Egypt professional collaborations. A collaboration is defined as a short or long term engagement with the National STEM Board and/or its members to build and maintain an Egyptian STEM network.

Data Source: Data from implementing partners (21PSTEM), signed agreements/MOUs, videoconferencing reports, and meeting notes, kept in ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** Interest and availability of STEM board members for collaboration.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist	**Method/Approach of Collection/Calculation**: Data calculated through direct counting of collaborations and each unique collaboration will be counted individually.
Data limitation and Quality Assessments: Timeliness of data depends upon National STEM Board availability.	**Data Analysis/Dissemination Plan:** ECASE will compile and report to USAID each year the cumulative list of collaborations achieving this performance indicator and the fiscal year in which that achievement is counted. **Other Donors in Sector:**
Indicator's Relevance to Gender: N/A	
Additional Comments:	

ECASE Objective 5: Support the MOE in the upgrading of science and mathematics curriculum standards, students assessment, and teacher preparation for the mainstream

Performance Indicator # 5.2.1: Annual number of policies adapted and implemented by the MOE
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**NA**	**1**	**2**	**2**	**5**
Actual	**NA**				

Indicator Description (Definition): Policy is an important piece of building the capacity of the CCIMD and NCEEE to apply Egyptian STEM best practices to the mainstream. The number of recommendations indicates the level of importance and participation of STEM to policymakers.

Data Source: Data from implementing partners and the CCIMD and NCEEE; meeting reports and notes, recorded in ECASE project records.	**Rationale/ Critical Assumptions for Indicator:** This indicator assumes that if a policy recommendation is adapted and implemented by the MOE, then it will be of high quality, as the MOE has responsibility for ensuring the relevance, cost, and feasibility of a policy before adapting it. It also assumes that the policy-making environment will be receptive to STEM practices.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** ECASE M&E Specialist.	**Method/Approach of Collection/Calculation**: Direct counting the number of policies adopted/implemented by MOE.
Data limitation and Quality Assessments: Timeliness of data depends upon CCIMD and NCEEE staff availability.	**Data Analysis/Dissemination Plan:** ECASE will report data to USAID. - **Other Donors in Sector:**

Indicator's Relevance to Gender: N/A	
Additional Comments:	

ECASE Objective 5: Support the MOE in the upgrading of science and mathematics curriculum standards, students assessment, and teacher preparation for the mainstream

Performance Indicator # 5.2.2: Number of MOE (CCIMD and NCEEE) staff participating in project activities
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**15**	**15**	**20**	**20**	**70**
Actual	**15**				

Indicator Description (Definition): The role of CCIMD and NCEEE, the curriculum and assessment implementers of the MOE, is important to expand STEM in the Egyptian education system. The number of CCIMD and NCEEE members participating in project activities will expand awareness and understanding of the importance and relevance of STEM for Egyptian educational outcomes.

Data Source: Data from implementing partners including attendance sheets, training registration sheets, and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** The buy-in of MOE officials in ECASE activities is critical for sustainability. ECASE assumes the continued interest and availability of CCIMD and NCEEE staff, in particular.
Schedule/Frequency of Data Collection: Annually **Responsible Officer:** M&E Specialist	**Method/Approach of Collection/Calculation**: Total number of members is calculated by the direct counting of the unique number of members participating in ECASE activities.
Data limitation and Quality Assessments: ECASE will ensure that the total number of participants are unique individuals and are not double counted by cross-checking attendance and ECASE project records. Timeliness of data depends upon CCIMD and NCEEE staff availability.	**Data Analysis/Dissemination Plan:** Attendance data is collected by the trainer responsible for each event directly from the ECASE participant responsible for the training or event and submitted to ECASE staff for review and data entry into the project database. Project results data will be documented with a complete list, maintained at ECASE HQ, of all qualifying trainees. **Other Donors in Sector:**
Indicator's Relevance to Gender: N/A	
Additional Comments:	

ECASE Objective 5: Support the MOE in the upgrading of science and mathematics curriculum standards, students assessment, and teacher preparation for the mainstream

Performance Indicator # 5.3.1: Number of outreach events held on STEM best practices
Unit: Number

Results Data	FY 12-13	FY 13-14	FY 14-15	FY 15-16	TOTAL
Targeted	**NA**	**TBD**	**TBD**	**TBD**	**TBD**
Actual	**NA**				

Indicator Description (Definition): Outreach events, which can include media events, dissemination workshops, and conferences on STEM best practices, will highlight and promote the importance of STEM to broader Egyptian communities.	
Data Source: Data from implementing partners, including attendance sheets and ECASE project records via a project database.	**Rationale/ Critical Assumptions for Indicator:** Interest and availability of Egyptian communities.
Schedule/Frequency of Data Collection: Annually	**Method/Approach of Collection/Calculation**: Calculated by direct counting the number of newspaper articles, radio programs, conference attendance lists, conference programs, and other similar events, as defined as outreach event.
Responsible Officer: M&E Officer	
Data limitation and Quality Assessments: None.	**Data Analysis/Dissemination Plan:** Each event will be counted directly. Project results data will be documented with a complete list, maintained by ECASE.
	Other Donors in Sector:
Indicator's Relevance to Gender: N/A	
Additional Comments:	

Appendix B: Glossary of Terms and Concepts

Baseline
Baseline is a record of what exists in an area prior to an action. The baseline values establish the starting point from which change can be measured.

Critical Assumptions
Refers to conditions outside the control of project that are likely to affect results that we assume will or will not take place.

Data Analysis
Concise description of how performance data for individual indicators or groups of related indicators will be calculated to determine progress on results. Data analysis techniques and data presentation formats are identified.

Data Limitations
Identification of where data may be weak or limited and description of actions taken to address data limitations.

Data Source
The source is the entity from which the data is obtained, usually the organization that conducts the data collection effort. Data sources may include government departments, international organizations, other donors, NGOs, private firms, USAID offices, contractors, Partners, or activity implementing agencies.

Disaggregated
How data will be separated to improve the breadth of understating of results reported. Typical ways to disaggregate data include geographic location and gender.

Estimated Cost of Collection
Estimated cost of data collection efforts to the contractor or implementing Partner. Personnel time to follow normal monitoring and evaluation activities is usually not incorporated.

Frequency of Data Collection
How often data is to be collected. The frequency of monitoring will depend on the variables being investigated. Depending on the performance indicator, it may make sense to collect data on a quarterly, annual, or less frequent basis. When planning the frequency and scheduling of data collection, an important factor to consider is management's needs for timely information for decision-making.

Indicator
An Indicator is specific information that provides evidence as to the achievement of (or lack of) results and activities.

Initial Data Quality Assessment
Date when the Operating Unit reviews the characteristics, attributes, and caliber of data being provided to the Strategic Objective by implementing Partners.

Management Utility
Description of the usefulness and purpose of the indicator to management decision-making.

Method/Approach of Data Collection: Process or technique employed in the data collection. It includes identification of whether data is primary or secondary data. Primary data is data collected specifically within the context of the community. Secondary data is data collected by another source for some other purpose but is used by the program.

Performance Monitoring Plan
A comprehensive performance-monitoring plan is designed to track program/project results in all the program/project phases. The variables to be tracked are carefully selected and they must be good measures of the anticipated changes. The monitoring plan describes all the indicators to be monitored, the units of measurement, data sources, methodology of data collection, monitoring frequency, responsibility, baseline values and targets set within the planning horizon.

Precise Definition
The indicator definition states what it is that should be measured. They define the variables that help measure change within a given situation as well as information that describes progress and impacts. The definition must be detailed enough to ensure that different people at different times, given the task of collecting data for a given indicator, would collect identical types of data.

Presentation of Data
Concise description of how data results will be displayed such as the use of tables or maps.

Reporting of Data
Concise description of how data results will be accounted and whether results are appropriate for inclusion in the report

Responsible Organization / Individuals
Responsibility is used here to refer to the institutions or organizations (government counterparts, NGOs, contractors) collecting the monitoring data. For each performance indicator, the responsibility the operating unit for the timely acquisition of data from their source should be clearly assigned to a particular office, team, or individual.

Review of Data
Dates when the USAID operating unit's review progress (and reliability) of data collection efforts to date and discuss preliminary results. Reviews identify key questions to be resolved.

Stakeholders
The local groups of community institutions, organizations and individuals who have a vested interest in improving the management of natural resources in the target areas (stakeholders may include local government institutions, commercial enterprises, private, group and communal landowners, community based organizations and non-governmental organizations).

Target
Magnitude or level of outputs, outcomes, or impacts expected to be achieved. Targets are values against which the actual program/project achievements are measured. They should be realistic and quantitative statements of expected outcomes. If the targets are qualitative, there is need for a detailed statement of expected state of affairs at the end of a planning period.

Target Group
The direct beneficiaries the program/project aims to reach.

Unit of Measurement
The unit of measurement is the precise parameter used to describe the magnitude or size of the indicator.