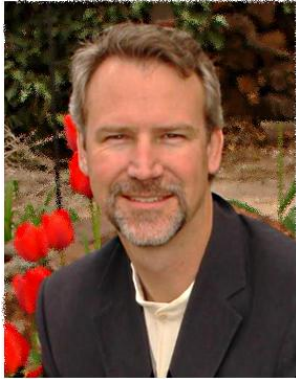


Evaluating Effective Teaching and Learning  
Across Multistakeholder Partnerships

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## Abstract

Through a survey of evaluation data and reports collected from studies of successful ICT use in schools across 50 countries, the contextual factors regarding how schools can effectively integrate ICT is examined. By reviewing the history of Intel's evaluation reports and studies collected, this paper describes the process of applying a strategic evaluation design and discusses the systemic factors associated with understanding classroom level change. In addition, guiding principles that encompass multistakeholder partnerships in education as they relate to monitoring and evaluation of education technology initiatives will be presented. As a result, overcoming the challenges of creating an evaluation strategy for new programs, the challenges of sustaining programs on a global scale, and the challenges of effectively managing ongoing evaluation efforts are confronted through carefully designed collaboration strategies. By referencing the early design components of the Intel® education initiatives for teacher professional development and informal education programs, this paper will illustrate the challenges associated with maintaining a single agency partnership and the successful transition that resulted in collaborative efforts with over two dozen agencies worldwide. Transforming education systems and supporting national competitiveness are difficult, long-term endeavors. On-going, embedded evaluation can help create policies that support real change. The paper will conclude with discussions of a technology enriched local school development plan involving multiple internal partnerships, and a large scale, education reform initiative involving multiple ministries of education, non-governmental agencies and three multinational corporations. Although the projects are significantly different, both cases illustrate necessity for a common framework to be understood that begins with clear goals and objectives, implementation strategies, and local contextual dependencies.

## Introduction

Across the globe, conversations are taking place about the challenges facing education systems in transforming the classroom into a teaching and learning environment that enables new ways to explore, learn, and share knowledge. These conversations are increasingly turning to the role of technology in education. Inevitably, these same conversations turn to questions regarding the effectiveness of technology integration and what impact technology plays in the quality of teaching and learning in today's classroom.

For those in the private sector who are involved in the many aspects of education technology, the questions frequently challenge both the motives for their involvement and the efforts associated with understanding the effectiveness of these efforts. There is rarely agreement on the roles and methods of such private sector involvement, but there is agreement that as the demand for high-level skills continues to grow, the tasks associated with transforming traditional models of schooling to meet these demands are often hidden within the complex political, social, and educational systems in which they are so deeply embedded. Increasingly, the private sector is establishing partnerships with governments, non-governmental organizations, academia and each other to address the

challenges associated with the numerous education reform efforts. For the multinational corporation, their global presence provides a perspective that can inform agencies intent upon transforming learning environments in local and global ways. Identification of the activities that support a shift from traditional education systems to the desired innovative learning environment will require exploration beyond the classroom to include the wide-ranging systemic change of programs, practices, and policies based on the application of a clear theory of change.

The goal of this paper is to discuss an effective strategic evaluation design adopted by the Intel education initiatives and help audience participants address some of their own concerns in designing an evaluation strategy involving partnerships. By referencing established, yet evolving components of its evaluation design and key findings, the Intel® Teach and Intel® Learn evaluation strategies will be presented. In addition, the larger, systemic factors associated with multistakeholder involvement in understanding classroom level change will be discussed. The paper will conclude with a brief discussion of a new interactive online community of to support education reform.

## Background

For over a decade, Intel® Corporation has been helping K–12 teachers to become more effective educators by training them on how to integrate digital technology into their lessons, and to promote problem solving, critical thinking and collaboration skills among their students. Following the introduction of computers in US classrooms in the early 1990's, there were few teacher professional development programs available to help teachers use this new technology in their efforts to improve student learning, (West, 1990; Yost, et al., 2004). The critical issue at the time was if teachers understood how technology contributed to classroom instruction. As a result, the type of teacher professional development—meaning the methods of teacher-training, the length of that training, and the training content—began to shift beyond hardware and software use to emphasize the instructional purpose of the technology and the impact on education (Makrakis, 1991), as well as the need for an improved quality and nature of teacher-training (Hannifan, et al., 1987).

By the end of the decade, U.S. Secretary of Education Richard W. Riley stated in a speech at the National Conference on Education Technology, “Teaching and learning that uses technology effectively can lead to greater academic success and make a real difference in the lives of students.” He also added that, [technology] “. . . is not a substitute for solid teaching and learning - but a tool to help teachers teach and help students learn at the highest levels and helps teachers teach more effectively. Technology is one part of a comprehensive quality learning experience that, at its very core, involves the concept of teaching people to think and to continue to learn throughout their lifetimes so that they can benefit from change” (Riley, 1999).

To address the need for teacher professional development that moves beyond applications, the Intel® Foundation contracted with the non-profit Institute of Computer Technology in March 1998 to collaborate on content development and to create a

program designed to train classroom teachers how to integrate computers into their existing curriculum. In 2008 the program began to be recognized as the Intel® Teach Program, and had trained more than five million teachers in more than 40 countries. To date, the program has trained more than seven million teachers in more than 50 countries to be more effective educators by providing content and instruction in ways to effectively integrate technology into their lessons to promote problem solving, critical thinking and collaboration skills among their students, and is committed to reaching 13 million teachers by 2011 (Intel, 2008).

A key element of the Intel® Teach program is maintaining localized content and administration through a train-the-trainer model where local training agencies recruit and train master teachers who will each train additional classroom teachers. In addition, Intel® partners with governmental entities to address various components of the education system including: policies, professional development, pedagogy, curriculum, assessment, information and communications technology (ICT) use, school organization, and at the higher education level, the development of technical curricula and research programs. Intel's involvement is intended to help educational systems move from an approach that emphasizes the acquisition of knowledge, to one that emphasizes conceptual understanding and the application of concepts to real-world situations. All of the programs are designed to improve the effective use of technology to enhance the quality of education, to promote the development of 21st century skills, and to encourage excellence in mathematics, science, and engineering (Light, et al., 2009).

In addition to program and infrastructure investments, Intel® has also invested in rigorous program evaluation to establish and sustain continuous improvement of these educational products and activities. The research and evaluation compiled for this purpose has not only enabled the improvements of the program development efforts, but now also comprises a comprehensive body of evidence that demonstrates program impact (Michalchik, Light & Price, 2009). As a result of these efforts, critical evidence has emerged that may inform efforts to measure impact related to ICT in education in terms that extend beyond student assessment to address complex systemic factors.

## Evaluation Design

The Intel® Education programs worldwide are evaluated by local research teams which conduct studies within individual country and language contexts. To ensure a consistent approach across the international programs, these local teams are based upon a framework that begins with a conversation between the evaluators and the program managers to articulate clear goals and objectives, implementation strategies, and local contextual dependencies of the project. From these conversations, the evaluator can begin to identify specifics around the intervention, the theory of change, and the research questions that identify measureable indicators of success.

The evaluations vary depending on country context as well as program maturity. A look at the multiple dimensions of this comprehensive evaluation program considers a developmental approach to identify phases of evaluation in relation to program maturity.

Evaluations of programs in early stages of development, or pilot efforts, focus on formative data collection within the areas of localization, adoption, and comprehension. As program evaluation results were compared to the stated goals and objectives of the programs, a set of indicators have been identified that address relevant questions about program performance. Findings from independent evaluation resulting from the analysis of existing longitudinal end of training evaluation data indicate that after completing the teacher professional development program, teachers feel more prepared to address the challenges involved in making ICTs a part of everyday classroom activity and to feel more aware of good instructional practice regarding effective integration of technology in schools (Martin & Shulman, 2006).

Exploring evaluation efforts that enable program expansion while maintaining attention on continuous improvement processes and learner impact, or application of new skills within the classroom environment follow. Findings from independent evaluation six months after training reveals that teachers: 1) use technology much more for their own productivity and professional development, 2) use technology in more varied ways with their students, and 3) use different teaching approaches (e.g., project-based learning and formative assessment) than they did before the training. In addition, 91% of teachers report their students are more “motivated and involved” in their learning and 81% say student projects show “more in-depth understanding” (Light, et al., 2006).

Upon maturity, long-term follow-up evaluations focus on sustained learner-centered teaching, technology use and activities. This strategy is designed to identify key outcomes through consistent evaluation standards and using effective quasi-experimental designs, including such tools and methods as participant surveys, site observations, interviews, case studies, focus groups, and reviews of student work when applicable. It is a result of these follow-up studies that the complexities that influence teacher changes in attitude, knowledge, and behavior begin to emerge, and also reveal important environmental factors that must also be understood, in order to optimize teacher professional development efforts focused on classroom activities [Fig. 1].

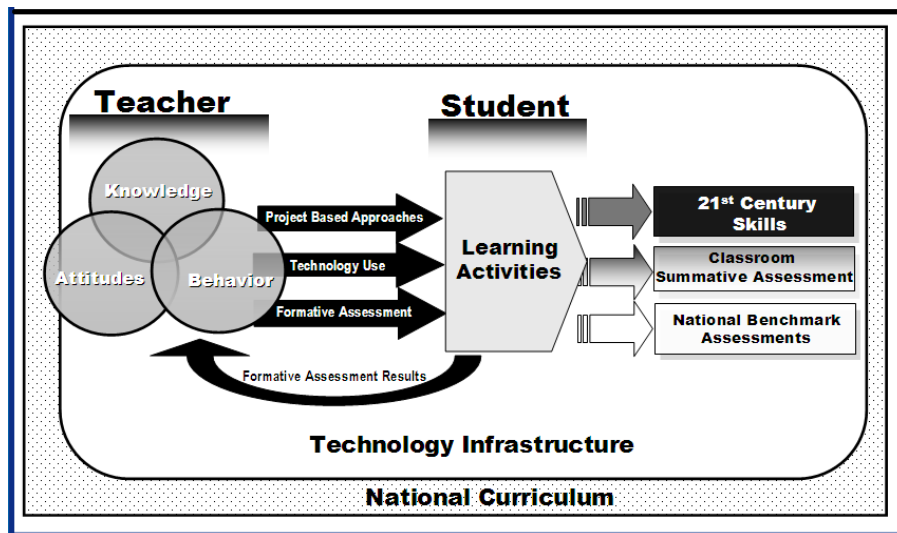


Figure 1. Logic Model of the Intel® approach to effective Teaching and Learning

## Partnerships Between Organizations & Evaluators

Intel® Education programs worldwide are evaluated by local research teams conducting studies within individual country and language contexts. To ensure a consistent approach across the international programs, these local teams are guided by the Intel corporate Education Research Manager and two key global research partners: EDC/CCT and SRI International.

Since 2003, Intel has entrusted the worldwide evaluation of the Intel Teach program to the Education Development Center (EDC)'s Center for Children and Technology (CCT). This research organization has conducted investigations for numerous large-scale and well-known educational technology initiatives throughout its more than 25 years of evaluation research work.

For Intel, EDC/CCT investigates the roles that technology can play in improving teaching and learning inside and outside the classroom. The organization evaluates educational initiatives, projects, and programs, and conducts basic, applied, formative, and partnership research in collaboration with educational, corporate, government, and research institutions. EDC/CCT is responsible for creating initial end-of-training and impact survey evaluations and reports that informed the course implementation and revisions of the global of Intel Teach program.

Since 2003, the Center for Technology in Learning at SRI International has conducted a global impact investigation of Intel Learn. SRI International is an independent, nonprofit research institute that conducts client-sponsored research and development for government agencies, commercial businesses, foundations, and other organizations. SRI International works closely with the corporate Intel evaluation team and local evaluators in the countries where the program is implemented to design and coordinate a comprehensive model for evaluating program implementation and impact of the informal educational ICT curriculum.

Essential to each of the primary evaluation agencies role is the interaction that enables the funding agency to articulate clear goals and strategies based on sound theories of change. A theory of change illustrates the connection between the intervention—consisting of inputs, activities, and outcomes— and the population affected. As a result, a knowledgeable evaluation agency can make use of theory-based evaluation to provide clarification regarding the steps embedded in a logic model of how activities lead to impact. Identifying accurate variables and metrics requires awareness and attention to a program's goals and objectives and its underlying theory of change (Brest, 2010).

In order to transform general project goals and objectives into observable and measurable phenomena, it is crucial to have a clear and realistic understanding of the project design and reasonable expectations. The evaluation design must consider that schools are full of complex political and social dynamics. As such, robust methods for monitoring and measuring progress toward these goals are developed with stakeholder participation, with specific consideration to the context of the intervention.

To understand effective teaching and learning we must apply analytic approaches that look at patterns and profiles of skills and practices in addition to the quantitative differences. There are two main types of evaluation, and each type has a different function. Formative evaluation seeks to provide feedback on program implementation and design to improve the overall program, and summative evaluation seeks to understand how and whether a program has affected an outcome. Furthermore, there are two main methods of data collection, both are necessary in order to generate a complete picture of the impact of an intervention in the complex education system. Quantitative methods, like surveys, can indicate that a change in practice or performance may or may not have taken place, but they provide only a superficial understanding of these changes. Qualitative methods, like observations or interviews, can provide a more complete understanding of why and how these changes have developed (Douglas, 2009).

The multifaceted approach designed by the objective, third party evaluators such as the SRI and EDC teams is intended to provide enough different measures to determine whether the Intel programs are teaching students better ways to use and integrate technologies and helping students to acquire 21st century skills, including technology skills, collaboration, and critical thinking. In addition, they also support local evaluators around the world with the design and development of studies that take into account the challenges and needs of unique geographical contexts.

### **Development, Growth and Sustainability: Building Collaboration on a Global Scale**

Moving beyond partnerships with the primary evaluation agencies, a global deployment strategy requires resources beyond what is feasible for a single or even shared agency capacity. Although a centralized structure is critical to provide a systematic approach and ensure consistency at such a broad scale, there are significant challenges one will face in collaborating across multiple countries and multiple agencies.

When the challenge of creating an evaluation strategy for a new program is overtaken by the challenge of expanding and eventually sustaining the program on a global scale, effectively managing expanding evaluation activities may be accomplished by revising and expanding collaboration strategies as well. In the case of the Intel programs, the evaluation strategy addressed varying levels of understanding and practice, while transitioning from a centralized structure to include the collaborative efforts of over two dozen agencies worldwide. Transforming education systems and supporting national competitiveness are difficult, long term endeavors. On-going, embedded evaluation can help create policies that support real change. In order to evaluate the Intel Teach program around the world, Intel could not do this work alone. A strategy was developed to coordinate between the Intel evaluation managers, the primary central agencies (EDC, SRI) and local evaluators who understood the local context and could inform the process at the country level and could collect the required data in the field.



Initial steps of the Intel evaluation strategy reinforced the early design components of the Intel Teach teacher professional development program. First, fidelity of the core curriculum localization and implementation was established by maintaining a close relationship between local curriculum teams and local evaluators to monitor translation efforts as they would apply within each individual context. Initiating formative evaluations of early stage pilot training sessions were key to successful curriculum development and training plans. Survey data was collected following each training session, and later during follow-up with participants establishing benchmarks for key pedagogical shifts in teaching and learning strategies. Core, standardized protocols and instruments allowed each agency to collect comparable data, create data tables, conduct local analysis, and then submit the data to allow a global synthesis report to be produced.

Challenges in managing evaluation efforts such as these on a global scale are to be expected. Challenges encountered while developing a global evaluation strategy for the Intel Teach program included: 1) scale, working with over two dozen agencies worldwide, 2) responsiveness – getting all evaluators to produce reports on time, and 3) consistency – getting all evaluators to provide data in forms that can be merged together. However, many have been addressed by developing resources that ensure consistency within the data collection process, partnerships that enable discussion and collaborative analysis, and finally, sustained support for the local agencies through consultation, training, and an online community of practice.

To address these challenges, standards of practice and standardized data collection and reporting forms were developed, and timelines and deadlines were developed and built into proposal templates and agreements. Today, the Intel Teach evaluation portfolio of resources has contributed to how many smaller, local evaluation agencies have developed their evaluation capacity. In turn, new evaluation design process benefit from insight and input now available at the local level.

#### Partnerships at the point of impact

- Support capacity building activities by involving an evaluator from the very beginning, maintaining accurate records & making reports accessible.
- Establish that all projects offer meaningful roles for partners that allow them to co-develop and create the resources instead of relegating to pure execution and implementation.
- Participate in collaborative discussion to clearly understand the “logic model” or “theory of action” of the specific intervention(s).
- Identify key personnel with interest & desire for student centered learning through technology: teachers, teacher leaders, tech staff, and/or administrators.
- Build a culture of whole school reform through support and development of teacher & leader knowledge, attitudes, and behaviors.

(Price, 2009)

## Partnership in Action

Current research and evaluation findings of the Intel® education initiatives suggest that student-centered education reform using ICT requires much more than just the introduction of a new tool or one new practice. Instead, change begins by deeply reshaping life in the classrooms, starting with educators' knowledge, attitudes and behaviors regarding effective teaching and learning within a student centered approach. As such, teachers must find relevance and points of engagement between models of ICT use and their own teaching. Evaluation and assessment efforts that go beyond monitoring and accountability and identify the possibilities and limits within a given context can both document and support education transformation opportunities within the classroom that inform all phases of the teaching and learning process, especially that of professional development, curriculum and content. The following provides examples where the process of applying a strategic evaluation designs and systemic factors associated with developing partnerships has enabled education transformation in new and innovative ways.

### Case 1: Internal Collaboration

Often, collaborative partnerships develop within a single organization as the potential for impact extends beyond the scope of any single interest. These internal partnerships may experience a level of tension comparable to cross organizational collaborations which, in turn, may challenge and strengthen the partnership simultaneously. Although the strategies to coordinate an internal partnership are comparable to those one would pursue in establishing a cross organizational partnership, they may in fact, become more challenging due to divergent interests and or desired outcomes. Developing consistent strategies and coordinated efforts to manage these shared projects are necessary to address the separate and distinct facets of a single program.

Recently, a regional office within Intel's Corporate Affairs Group was involved in the development of a new technology focused high school centered on project-based learning that uses technology and investigation to engage students in 21<sup>st</sup> Century teaching and learning. Central to the Corporate Affairs Group mission is engaging in strategic corporate social responsibility initiatives that enhance innovation by transforming policy, education, environmental and community agendas that effect positive change around the world. In addition, the Corporate Affairs Group also plays a critical role in partnering with Intel business groups and outside organizations to create a positive socio-economic environment and identify new opportunities in areas such as education.

Through coordinated efforts to minimize overlap, a model of synergistic collaboration was established between the regional corporate affairs office, the education research and strategy group, the Enterprise Solutions Group, and the school district to identify shared goals, define guiding principles, and develop the framework for a mutually acceptable approach in the new school's design and development. Following a planning period, implementation of the shared vision resulted in consultation with school officials on systems architecture and enterprise technologies, using technology to promote inquiry-

based learning and enhance collaboration, teamwork and communication skills, and finally in hosting workshops for students on computer care and internet safety.

Although each group had specific interests, regular planning meetings allowed discussions to take place that allowed a logic model to emerge that could illustrate the inputs, activities, outputs, and desired outcomes of the new school. Such discussions proved invaluable to identifying the resources that each could invest, the events associated with the technical access and infrastructure, the desired results of the innovative methods of teaching and learning, and finally the sequence of changes anticipated.

Frechtling, (2007) describes this process of providing a visual depiction of how a program is supposed to work in, Logic Modeling Methods in Program Evaluation.

- Describe the inputs, activities and outcomes of a program.
- Visually connect program inputs with short-term and long-term outcomes.
- Specify how the program activities relate to the ultimate outcomes of the program.
- Provide causal links between the operations of the program to short-term and long-term outcomes.
- Clarify the relationship between the program and the problem (and its determinants).

## Case 2: Multinational Corporations, Non-Governmental Organizations, Academia and Ministries of Education

While technology has made profound changes in 21<sup>st</sup> century business and everyday life, most educational systems operate much as they did at the beginning of the 20<sup>th</sup> century. As contemporary business and social practices engage people in collaborative efforts to solve complex problems and create and share new ideas, traditional instructional practices require students to work individually as they recall facts or perform simple procedures in response to pre-formulated problems within the narrow boundaries of individual school subjects. Often student work is done without the aid of computers, social networks, or other outside resources. School work is commonly shared with and graded by only the teacher, with little feedback to the student or opportunity for revision.

Today, significant reforms are underway within education systems around the world. What is learned, how it is learned, how it is taught, and how schools are organized are being studied, monitored and subjected to systems of accountability beyond efforts of recent years. Many previous, well-meaning and well-resourced attempts to reform education have stumbled because they were not able to demonstrate improvement on standardized tests designed for last century's education or because teachers declined to implement them, believing that their students would do poorly on these assessments.

Yet assessment reform, itself, is a major challenge that requires the efforts, resources, and expertise of not only governments, but industry, academia as well as non-governmental institutions. For this reason, the three companies — Cisco, Intel, and Microsoft, individually and together, are committed to facilitate research and development to

improve education, worldwide. They share a belief that high-quality education is important to society and the economy around the world. Each company has an extensive record of support for educational improvement. And together, the companies have worked with UNESCO and the World Economic Forum and other partners to support the development of the UNESCO ICT Competency Standards for Teachers and the Global Education Initiative.

Based on discussions and even direct requests for support from governments and academia, a joint Education Taskforce was set up by the three companies, in the summer of 2008, to review the range of problems, issues, and opportunities in education. The Taskforce chose to target assessment reform as the key factor that will unlock transformation of the educational system across the world. The Taskforce consisted of representatives from the three companies, and of Dr. Robert Kozma, commissioned to formulate a call to action and develop initial plans for a joint effort that would support assessment reform. Working within a shared philosophy that assessment reform was a challenge that no single segment of the education community or society could resolve, the taskforce set out to explore new ways of measuring student performance. Such an effort required not only expertise in measurement; it also required political commitment, technological capability, financial resources, and collaboration with the respective institutions. The Task Force consulted with policy makers, key academics, and assessment organizations, including experts associated with OECD's Programme for International Student Assessment (PISA) and with the International Association for the Advancement of Educational Achievement. The result was the formulation of the Assessment and Teaching of Century 21 Skills (ATC21S) project. In its first year, working groups were established to analyze the range of problems that inhibit assessment reform within their specified area and specify potential solutions that can advance assessment reform. Their deliberations included input from over 250 researchers across the globe. In addition, 6 pilot countries were identified, with a lead government representative on the Executive Board of the Initiative resulting in the formulation of an advisory board that also included the Director of PISA and Chair of IEA, the organization that sponsors TIMSS.

At the end of its first year, these working groups developed five white papers to serve as the basis for the project's subsequent work in formulating 21<sup>st</sup> Century skill assessments. The intent of the project is not to develop an assessment of its own. Rather, the project will provide research, methodology, policy framework, and a structure by which this international community can draw on and share existing knowledge and create effective solutions to address the problems, issues, and barriers associated with the identified skills and foster wide-scale adoption of assessment reforms. All products generated by the project will reside in the public domain.

For more information on the project, please visit the project website at <http://www.atc21s.org>.

## Conclusion

Evaluation and assessment can serve as important components of a holistic master plan for ICT integration. Each can provide valuable data to inform both the technology infrastructure and access component beyond consideration of only the various usage models, learning environments, and professional development efforts. Such a strategy begins with an understanding of clear goals, theories of change, and models that can be used to measure impact, ensure consistency, and reduce variability in the evaluation designs.

The inclusion of additional stakeholders or partners is often necessary to implement education reforms. Although the challenges of managing multi-stakeholder partnerships require constant attention to balancing and negotiation between various institutions, Intel has chosen a partnership model, using multiple evaluators in its program evaluation practice, because:

- This approach allows the company to tap into a broader set of strengths represented across the organizations,
- Local partnerships strengthen benchmarks and program success, and
- Perhaps most importantly, multiple evaluation partners help provides a more balanced, objective point of view.

Recommendations from the Intel education global evaluation strategy include, first, identifying stakeholders and building relationships as the foundation for an evaluation design that takes into account the context of the intervention. The addition of a local partner provides flexibility, cultural, social, and political awareness, and derives from an understanding that key systemic components of a process must be maintained but “one size does not fit all.” Furthermore, local partnerships foster ownership in activities that can lead to the identification of creative approaches and local capacity building (Mayberry, et al., 2008).

Second, conducting a needs assessment to establish benchmarks will allow program managers to focus activities and localize processes for greatest impact. Utilizing cross-site program benchmarks and systems specifically designed to measure changes in knowledge, attitudes and behaviors is critical for optimal gain from standardized protocols and instruments.

Only after a sufficient support network has been established does the planning process begin. At this point, an internal review of the technical capacities is necessary. Once infrastructure and access are understood, agreed upon and realistic timelines, budgets, methods, human resources, and reporting processes follow.

Next, during the implementation phase, mutually acceptable goals and objectives, and local contextual dependencies of the project must be defined. A review of the logic model and applicable theory of change is then aligned to implementation strategies. A discussion of methodology, protocols, instrumentation, resources and timelines should be the last step before field work is conducted.

Finally, analysis, synthesis, and review of the findings among key stakeholders informs the development of the final report and consideration of both format and structure that are useful for key audiences.

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