Educational Project Design and Evaluation

10

Chapter Outline

- Character of Educational projects
- Life cycle of educational projects
- Logic model for educational project design
- CIPP model for educational project evaluation.

By the End of This Chapter, You Should Be Able To

- Identify the life cycle of educational projects
- Clarify the processes of educational project design
- Use logic model to design educational projects
- Use CIPP model to evaluate educational projects.

Main Learning Activities

1. In your own words, state what is meant by educational projects and cite two specific examples.
2. Describe an educational project with which you have been involved and say what kind of work you did.
3. Describe the steps you might use to address the problem of an educational project in the example you have just described.
4. Use the life cycles of educational project to explain the example you found in learning activity 1. Indicate similarities and differences with regard to the instructional design process discussion in a previous chapter.
5. Use the educational project design logic model to design an educational project to fix the problem of low performance of students in math.

Situation: In one math class, 60% of the students are sleeping, 20% of the students are following teacher, 20% of the students are playing with their phones, and teacher is reading the textbook.

6. Think about the relation among main factors in logic model and in CIPP model. Explain the difference between outputs and outcomes. Which of those two is directly linked to goals and objectives?

10.1   Introduction

Nowadays, the available and affordable resources and technologies which could support learning and instruction are plentiful. However, choosing the best resources for instruction in various situations is an increasingly challenging task for designers, teachers, administrators, and so on. According to Spector and Yuen (2016), the use of educational technology requires attention to (a) effective and efficient design, development, and deployment and (b) providing the best results for the relevant constituencies. In terms of how to make sure the educational technology is best used, the educational project design and evaluation provide an innovative approach to dealing with educational problems.

In this chapter, we will introduce the concept of educational project, the methods to design educational project, and the model to evaluate educational project. The purpose of this chapter is to help develop the capacity of the instructor to use project approach to fix the problems of education.

10.2   Educational Project

10.2.1   Definitions

In universities, national education departments, or local school districts, there are lots of research or development projects, which show that using of project approach to solve educational problems is an essential method used by researchers and teachers. A project is a series of activities or a structure aimed at bringing about clearly specified objectives within a given time and budget (ILO, 2010). So as to educational project, the goals and objectives, budget and times, and clear beginning and ending should be considered.

Educational project can be defined as a planned effort to bring about desired educational outcomes that have a budget, resources, a definite beginning, a duration, and reasonably well-defined goals and objectives (Spector & Yuen, 2016).

10.2.2   Characters of Educational Project

According to the definition of educational project, we can know some characters of educational project, such as desired educational outcomes, clearly start and end, and well-defined goals and objectives. In order to achieve viability and sustainability, a development educational project, regardless of its size and extension, should be oriented to the following characteristics (ILO, 2010):

- The starting point of a project is the existence of a problem affecting a certain group.
- A project is a participatory exercise from start to end.
- A well-defined project is result-based.
- Being result-based, a project seeks clearly defined objectives or outcomes, and it includes a series of interrelated and coordinated activities.
- Whereas the problem is the project's starting point, the objectives are the end point.
- Project implementation is organized with a fixed budget, limited resources, and specific deadlines.
- Each project has a specific management structure.
- Each project includes a monitoring and evaluation (M&E) system.
- A project has to be sustainable in relation to society, finance, institution, and environment.
- Finally, each project is unique.

10.2.3   Life Cycle of Educational Project

Every project must follow a series of phases, allowing the process to be booted before the problem is identified until it is resolved. This series of phases is known as the life cycle of project (shown in Fig. 10.1). Project life cycle generally involves: (1) tasks completed at each stage or substage and (2) the team responsible for each of the phases defined (Prabhakar, 2009). Figure 10.1 depicts a typical project cycle which is somewhat familiar to the instructional design model presented in a previous chapter.

10.2.3.1   Initiating Processes

The initiating processes determine the nature and scope of the project. The main purpose is understanding the situation of projects through analyzing the business needs/requirements in measurable goals, reviewing the current operations, and analyzing stakeholder input (including users and support personnel for the project).

10.2.3.2   Planning Processes

After the initiation stage, the project is planned to an appropriate level of detail. The main purpose is to plan time, cost, and resources adequately to estimate the work

Fig. 10.1 Life cycle of
educational project
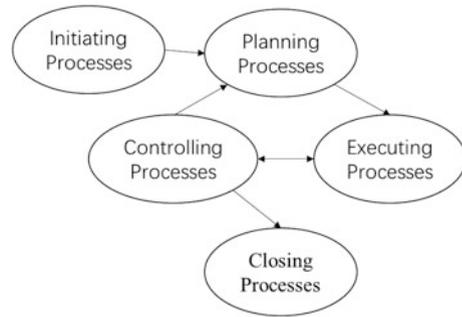
needed and to manage risk effectively during project execution. Planning is an
ongoing effort throughout the life of the project.

10.2.3.3   Executing Processes

The executing phase ensures that the project management plans prepared at the
planning stage are executed accordingly. This phase involves proper human
resources, financial resources, and time arrangements. The output of this phase is
the project deliverables.

10.2.3.4   Controlling Processes

Project performance must be monitored and measured regularly to identify the
outcomes from the plan. Controlling processes ensure the project objectives are met
by monitoring and measuring progress regularly to identify outcomes from the plan
so that corrective action can be taken when necessary. Controlling process also
includes taking preventive action in anticipation of possible problems.

10.2.3.5   Closing Processes

This is generally conducted at the end of the project to see whether the planned
benefits were achieved. Lessons learned are underlined and could be documented so
that they can be replicated or scaled up and integrated into future cooperative
development strategies and projects.

10.3   Design of an Educational Project

10.3.1   Logic Models

When planning educational projects, sometimes it needs to have a visual repre-
sentation with the textual explanation together to illustrate the effort, the nature of
the situation, the choice of a particular solution, and the expectation of specific

results of the effort. The visual representation can be called as a logic model. When designing an educational project, we should know what kind of problems to solve, what kind of effort would be applied, and what results would be achieved. In other words, we should know the goals, inputs, outputs, and outcomes (see Fig. 10.2).

10.3.2   Goals

A project has a goal and objectives, a beginning and an ending. The beginning could be analyzing problems and setting goals. The goals usually come from problems in the situation. Thus, the first thing we need to do is problem analysis.

Every project aims to help solve a problem. The problem analysis can identify the negative aspects of the existing situation and establish a cause and effect relationship between the likely underlying causes of the problems in the situation. However, not all negative aspects are a problem. Each problem has a symptom that needs to be identified. The so-called symptoms refer to certain conditions, processes, feelings, or other phenomena or situations. Just like a person may have a headache because of a cold or it may be due to overwork. The headache is a symptom, and the cause of headache is the problem. Symptoms can be seen as a sign or indication of the problem. Spector and Yuan (2016) described a simplified problem analysis process, as follows (see Fig. 10.3):

Step One:

Use all the facts and available data to describe the problem symptoms. Select the most important problem symptom and ask: What happened? What is happening? What are the specific symptoms? Why does this happen?

Step Two:

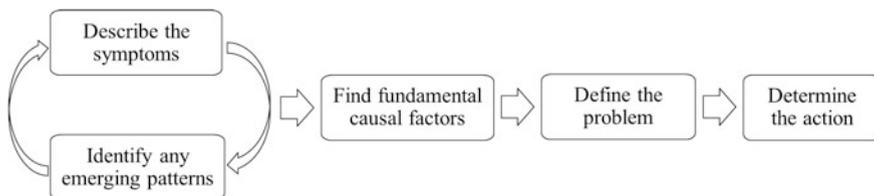**Fig. 10.2** A basic logic model

Fig. 10.3 Problem analysis process

Identify any emerging pattern. Record and compile possible explanations and ask: What proof do we have to prove that the problem exists? What is the impact of the problem?

Step Three:

Continue step one and step two until the explanation converges to some basic causal factors. Concern about the systemic interpretation and ask: What sequence of events led to the problem? What conditions allow the problem to happen? What other issues center around the occurrence of central problems?

Step Four:

Define the problem or problems by describing their root causes. Determine the system structure relationship that is creating the conditions that need to be corrected and ask: Why do causal factors exist? What is the real cause of the problem?

Step Five:

Determine the action or actions required to change the system relationship that created the problem or problems. Suggest implementing a solution and ask: How will the solution be achieved? Who is responsible? What are the risks of implementing the solution?

When problem or problems are ensured, the goals or objectives are also emerged. The goals or objectives can be thought as the situation in the future, once problems have been resolved. The negative situations of the problem are converted into solutions and expressed as positive achievements of the objective.

10.3.3 Input Factors

To implement a project, input factors are necessary. Inputs typically include such things as resources required and obtained, training materials developed, training provided, results of quality reviews and small-scale field tests, and so on (Spector & Yuan, 2016).

A resource (input) plan helps to present all the materials and resources needed for project implementation. It lays down the requirements for staff, equipment and materials, and budgeting, and provides the cost of the required resources. The resource plan lists the requirements and costs of all necessary inputs: personnel, basic office premises or facilities, equipment and materials, or services such as special subcontracting supplies, training workshops, and other miscellaneous inputs (ILO, 2010).

Resource (input) plans need to be tailored to specific activities and actions. For each activity, a list of inputs is prepared, which can then be aggregated by category to prepare an overall project resource plan (ILO, 2010). Figure 10.4 shows a sample of resource plan.
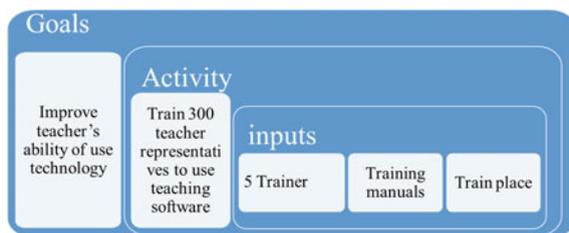
Fig. 10.4 A sample of resource plan

10.3.4   Outputs

In order to achieve the goals of the project, many activities or action needs to be set up. The outputs are the products of the activities. An output has to be: (1) delivered by the project, (2) demand-driven and not supply-led, (3) stated clearly in verifiable terms, and (4) feasible with the available budget (ILO, 2010).

The outputs are achieved by setting measurable indicators. Indicators are an objective measure of whether and to what extent progress has been made (related to project objectives and outputs). Performance indicators usually need to be at the output level (ILO, 2010). And indicators of output should not be a summary of what has been stated at the activities, but rather a measurable result of the execution of the activity.

When developing the indicators of outputs, the verification methods also need to be considered and designated. This will help test whether the indicators can actually be measured with reasonable time, money, and effort or not.

The means of verification should specify (ILO, 2010):

- How to collect the information (e.g., from video records, sample surveys, observation,) and/or the available documented source (e.g., final products).
- Who should collect/provide the information (e.g., local government workers, contracted survey teams, the project management team).
- When information should be collected (e.g., monthly, quarterly, annually).

10.3.5   Outcomes

The outcomes are often divided into short-, medium-, and long-term outcomes. The short-term and medium-term outcomes are usually linked directly to the goal of the effort or the specific problem situation that drives the effort (Spector & Yuan, 2016). For example, the problem is that too many high school students did not go to college to continue their studies. Then, the short- or medium-term result of this effort is to increase the rate of enrollment—perhaps by 15% in the short term and 30% in the long term.

There are two points to emphasize at short-term and medium-term outcomes. First, the short- and medium-term outcomes should be directly and clearly linked to the situation of the problem and the goal of the effort. Second, the short- and medium-term outcomes are usually measured, like outputs (Spector & Yuan, 2016).

However, long-term outcomes are often unmeasurable for a variety of reasons (Spector & Yuan, 2016). In education, the long-term outcomes might increase the quality of national population, the rate of employment in a particular field, or the rate of postgraduate entrancement. Those long-term outcomes can benefit the interest to the institution or to society. However, measuring these long-term results often exceeds the scope of the effort (Spector & Yuan, 2016).

10.3.6   A Representative Logic Model

Some of the ideas presented in this chapter will be new to many readers. To help make the process of developing a logic model to guide design, development, and deployment of an educational project, an actual case is presented in abbreviated form next. This case involved a multi-year effort in a large school district with about 40 schools and nearly 50,000 students to redo the entire computing infrastructure of the district so as to be able to implement personalized and adaptive learning throughout the school district. Needless to say, this was a very large project with many different stakeholders, including administrators, staff, teachers, students, and parents. It was evident at the beginning of the effort that key administrators and many teachers were enthusiastic about the effort. However, since such an effort would eventually involve all teachers as the key implementers of what was being developed, emphasis would be placed on strong and ongoing support for teachers, including a series of training sessions as the effort evolved.

In addition, it was imagined that some teachers would resist the dramatic changes planned. As a consequence, to gain support from all teachers, the first-year effort was devoted to addressing the concerns teachers had with the existing computer systems—primarily issues involving the student information system. Such things as a requirement for multiple log-ins to different parts of the system and duplicate entry of student data were reported and addressed first in an effort to gain widespread support for subsequent efforts that would affect teaching activities—namely creating individual learning plans for each learner that were previously only required for learners with disabilities. Special care was taken to automate and support as much of that new task as possible while helping teachers to adjust to new roles shifting from primary disseminators of information to coaches helping individual learners develop understanding.

A generic logic model and an actual logic model that was initially developed for the project described above are depicted below, as shown in Figs. 10.5 and 10.6.

While a logic model is intended to depict what is being done in an educational project, the model is usually complemented with a description of the rationale for the effort, which is called a theory of change. As a simple example, suppose a game is being designed and developed to help young learners understand how plants are
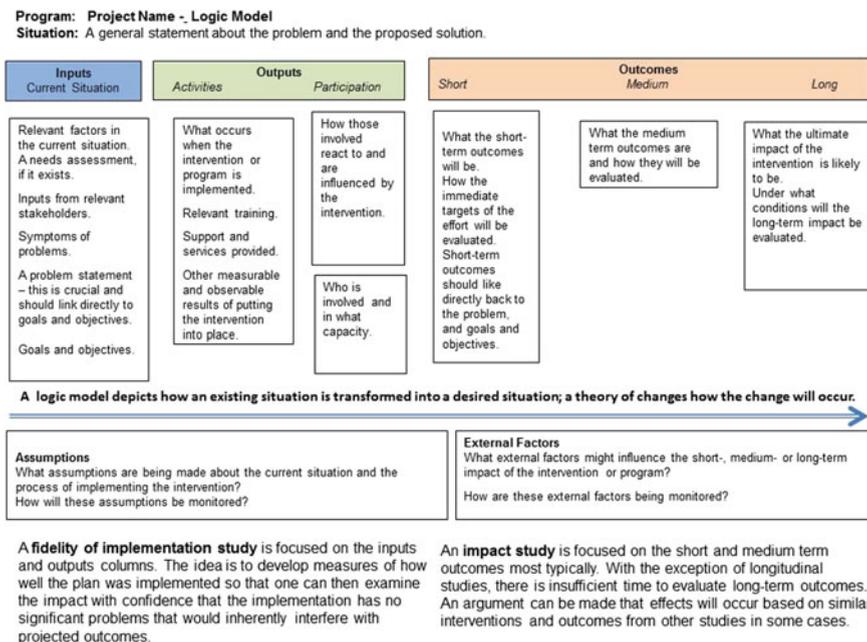
Program: Project Name - Logic Model
Situation: A general statement about the problem and the proposed solution.

Inputs Current Situation	Outputs		Outcomes		
	Activities	*Participation*	*Short*	*Medium*	*Long*
Relevant factors in the current situation. A needs assessment, if it exists. Inputs from relevant stakeholders. Symptoms of problems. A problem statement – this is crucial and should link directly to goals and objectives. Goals and objectives.	What occurs when the intervention or program is implemented. Relevant training. Support and services provided. Other measurable and observable results of putting the intervention into place.	How those involved react to and are influenced by the intervention. Who is involved and in what capacity.	What the short-term outcomes will be. How the immediate targets of the effort will be evaluated. Short-term outcomes should like directly back to the problem, and goals and objectives.	What the medium term outcomes are and how they will be evaluated.	What the ultimate impact of the intervention is likely to be. Under what conditions will the long-term impact be evaluated.

A logic model depicts how an existing situation is transformed into a desired situation; a theory of changes how the change will occur.

Assumptions What assumptions are being made about the current situation and the process of implementing the intervention? How will these assumptions be monitored?	External Factors What external factors might influence the short-, medium- or long-term impact of the intervention or program? How are these external factors being monitored?

A **fidelity of implementation study** is focused on the inputs and outputs columns. The idea is to develop measures of how well the plan was implemented so that one can then examine the impact with confidence that the implementation has no significant problems that would inherently interfere with projected outcomes.

An **impact study** is focused on the short and medium term outcomes most typically. With the exception of longitudinal studies, there is insufficient time to evaluate long-term outcomes. An argument can be made that effects will occur based on similar interventions and outcomes from other studies in some cases.

Fig. 10.5 A generic logic model

classified. An initial analysis of the problem situation might have suggested that students find the subject boring and do not spend sufficient time practicing classifying various examples. Research strongly suggests that the time spent on a learning task and that timely, informative feedback tend to improve learning performance. A game can potentially engage learners so that they are spending more time practicing albeit in the form of a game, and the game can also provide immediate feedback. Such a rationale becomes part of a theory of change, creating in effect a chain that goes from motivation to more time learning and more feedback to improved learning outcomes.

10.4 Evaluation of Educational Project

The purpose to evaluate the project is to conduct a comprehensive assessment of the completed project, to determine the relevance, effectiveness, efficiency, impact, and sustainability of the project to achieve the goal (ILO, 2010).

According to the logical framework, evaluation can be adapted in four aspects: context evaluation, input evaluation, process evaluation, and product evaluation. This evaluation model is named CIPP evaluation model developed by Daniel Stufflebeam and colleagues (Stufflebeam, 1971).
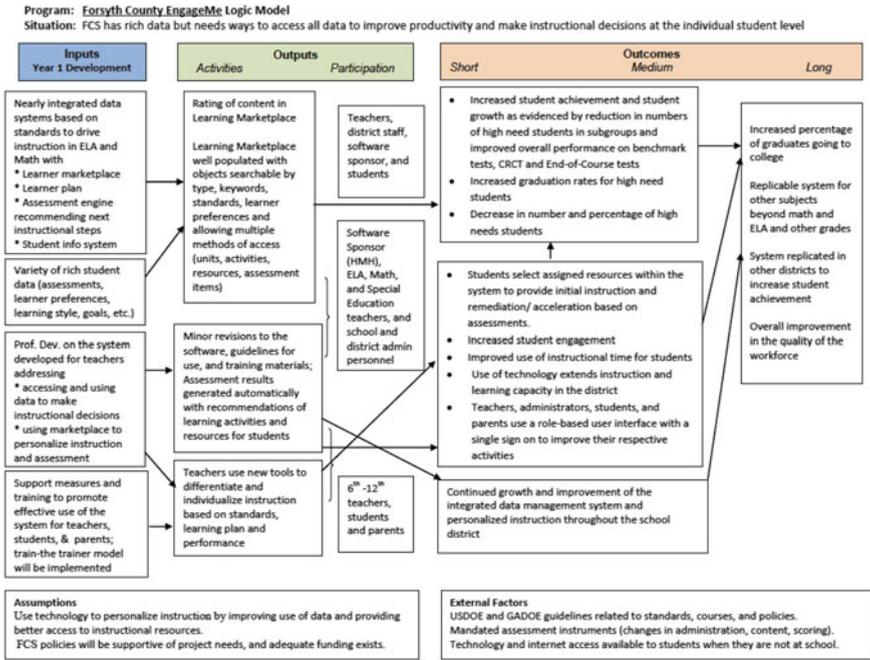
Program: <u>Forsyth County EngageMe</u> Logic Model
Situation: FCS has rich data but needs ways to access all data to improve productivity and make instructional decisions at the individual student level

Fig. 10.6 An actual logic model for a large project

Table 10.1 CIPP evaluation model

	Context	Input	Process	Product
Delineate	System variables and values	Problem specification Design criteria Constraints	Process decision points Milestones Barrier	Effectiveness criteria
Obtain	Performance and judgment date	Identification and analysis of strategies	Monitoring of procedure	Primary, secondary, and tertiary effects
Provide	Profile of needs, opportunities, and problems	Strategies by problem matrix	Process reports Exception reports	Description and explanation of project attainments and impact

The CIPP evaluation model includes two key dimensions, as shown in Table 10.1. The vertical dimension includes three steps in the evaluation process: delineating, obtaining, and providing. Delineating refers to the delineation of questions to be answered and the information obtained; obtaining refers to obtaining relevant information; providing refers to the provision of information to

decision makers so that they can use it to make decisions and thereby to improve ongoing plans. The horizontal dimension includes four kinds of evaluation: context, input, process, and product (Stufflebeam, 1971, 2003).

Context evaluation provides information about the strengths and weaknesses of a total system to assist in planning improvement-oriented objectives at each level of the system (Stufflebeam, 2003). The content usually refers to understanding the relevant environment; diagnosing special problems; analyzing training needs; determining requirements; and setting project goals.

Input evaluation provides information about the strengths and weaknesses of alternative strategies which might be chosen and structured for the achievement of given objectives (Stufflebeam, 2003). Input evaluation includes collecting training resource information; assessing training resources; determining how to effectively use existing resources to achieve training objectives; and determining whether the overall strategy for project planning and design requires the assistance of external resources.

Process evaluation provides information about the strengths and weaknesses of a chosen strategy under conditions of actual implementation, so that either the strategy or its implementation might be strengthened (Stufflebeam, 2003). The purpose of the process evaluation is to provide information feedback to constantly modify or improve the implementation process of the project. Process evaluation is mainly achieved through the ways as insight into the potential causes of failures in the implementation process; suggestions for eliminating potential failures; analysis of unfavorable factors leading to failures in the implementation process; and methods for overcoming unfavorable factors.

Product evaluation provides information for determining whether objectives or goals are being achieved and whether the change procedure which has been employed to achieve them should be continued, modified, or terminated (Stufflebeam, 2003). The main task of the product evaluation is to measure and explain the objectives of goals achieved by the activities of project, including both the measurement and the interpretation of the achieved goals.

Evaluation, based on the indicators, focuses on the project's implementation process and how the project contributes to the goals. Evaluation is the last step of the project cycle, but it is not the end of a project. Indeed, it can be considered the starting point for a new planning process, because the conclusions of the evaluation will allow the stakeholders to draw lessons that may guide future decision making and project identification (ILO, 2010).

Key Points in This Chapter

(1) An educational project is a planned effort to bring about desired educational outcomes, which has a budget, resources, a definite beginning, a duration, and reasonably well-defined goals and objectives.

(2) Every project has to follow a series of phases, allowing the process to be guided from the moment the problem is identified until it is solved. This series of

phases is known as the life cycle of project, including initiating processes, planning processes, executing processes, and controlling processes.

(3) The first step in the design phase is the identification goals of the project. The methodology used is called situation analysis. To prepare a result-based project, the following will have to be performed: (1) problem analysis and (2) objective analysis.

(4) Typical structure of a logical framework includes: (a) key aspects of the current situation, (b) activities associated with the effort (inputs), (c) the anticipated results of those activities (outputs), and (d) short-, medium-, and long-term outcomes of the effort.

(5) The CIPP evaluation model includes two key dimensions. The vertical dimension includes the three steps in the evaluation process called delineating, obtaining, and providing: delineating questions to be answered and information to be obtained, obtaining relevant information, and providing information to decision makers.

Learning Resources

1. A comprehensive discussion of logic models and a guide for logic model development by the W. K. Kellogg Foundation; see http://www.smartgivers. org/uploads/logicmodelguidepdf.pdf

2. infoDEV Web site for Knowledge Map: Impact of ICTs on Learning and Achievement. http://www.infodev.org/infodev-files/resource/ InfodevDocuments_154.pdf

3. The Institute of Education Sciences Web site entitled "Logic Models: A Tool for Designing and Monitoring Program Evaluations" by Biran Lawton, Paul Brandon, Louis Cicchinellil, and Wendy Kekahio—an excellent source for an overview of program evaluation located at http://ies.ed.gov/ncee/edlabs/ regions/pacific/pdf/REL_2014007.pdf

4. The International Society for Performance Improvement (ISPI) Web site has extensive resources pertaining to training and performance improvement. http:// www.ispi.org/

5. The USA National Science Foundation Evaluation Center (EvaluATE) focused on advanced technological education. http://www.evalu-ate.org/

6. Elsevier's Studies in Educational Evaluation journal—see http://www.journals. elsevier.com/studies-in-educational-evaluation/

7. Elsevier's Evaluation and Program Planning journal—see http://www.journals. elsevier.com/evaluation-and-program-planning/

8. Springer's Educational Assessment, Evaluation and Accountability journal— see http://www.springer.com/education+%26+language/journal/11092

9. Sage's Educational Evaluation and Policy Analysis journal—see http://epa. sagepub.com/

10. Taylor & Francis/Routledge's Educational Research and Evaluation journal—see http://www.tandfonline.com/toc/nere20/current
11. The independent Practical Assessment, Research & Evaluation open, online journal—see http://pareonline.net/
12. NOAA Office of Education and Sustainable Development paper on Designing Evaluation for Education Projects—see http://wateroutreach.uwex.edu/use/documents/NOAAEvalmanualFINAL.pdf.

References

ILO. (2010). *Project design manual, a step-by-step tool to support the development of cooperatives and other forms of self-help organizations*. Retrieved from http://www.ilo.org/public/english/employment/ent/coop/africa/download/coopafricaprojectdesignmanual.pdf.

Prabhakar, G. P. (2009). Projects and their management: A literature review. *International Journal of Biometrics, 3*(8), 3–9.

Spector, J. M., & Yuen, A. H. K. (2016). *Educational technology program and project evaluation*. New York: Routledge.

Stufflebeam, D. L. (1971). The relevance of the CIPP evaluation model for educational accountability. *Journal of Research and Development in Education, 5*(1), 19–25.

Stufflebeam, D. L. (2003). The CIPP model for evaluation. In T. Kellaghan & D. L. Stufflebeam (Eds.), *International handbook of educational evaluation* (pp. 31–62). Dordrecht: Springer Netherlands. Retrieved from https://doi.org/10.1007/978-94-010-0309-4_4.