

How to Design a Fifth Dimension Site Assessment Program

What does it mean to say that Fifth Dimension site works or does not work? In some situations, it is important to provide scientifically-acceptable information concerning the effectiveness of a Fifth Dimension program. One way to assess a Fifth Dimension site is to determine the cognitive changes that can be attributed to participation in the program. Five key issues in designing a site assessment program are (a) what to assess, (b) where to assess, (c) how to assess, (d) who to assess, and (e) when to assess.

What to assess. It is worthwhile to select measures that tap the informal nature of the Fifth Dimension and at the same time have some relevance to academic cognitive measures. Therefore, we have selected measures of computer literacy knowledge (because learning to use computers is a major Fifth Dimension activity), comprehension skills (because Fifth Dimension participation fosters learning to understand and explain game instructions), and problem-solving skills (because Fifth Dimension participation fosters learning to plan strategies for various games). Although these measures are designed to tap cognitive changes, there is also a need to assess social, motivational, or affective changes.

Where to assess. We recommend using a variety of settings ranging from embedding tests within authentic Fifth Dimension activities (such as playing an educational game at the site) to administering paper-and-pencil exercises in a traditional school setting.

How to assess. Perhaps, the most challenging issue involves the problem of how to create experimental control in an informal field setting. It is not enough to find that Fifth Dimension participants produced a pretest-to-posttest gain in their performance, because we need to compare their performance to the performance of a comparison group that did not attend the Fifth Dimension. We recommend any of the following five techniques for creating comparison groups.

1. *Comparing gains with matching based on student characteristics.* Invite a group of students to attend the Fifth Dimension (treatment group) and for each student identify a non-attending student who is matched on important characteristics such as grade level, level of English language proficiency, and gender (comparison group). Administer pretests and posttests to both groups, compute pretest-to-posttest changes on each kind of test for each student, and determine whether the mean pretest-to-posttest change is greater for the treatment group than the comparison group (e.g., using t-test for related measures).
2. *Comparing gains with matching based on pretest score.* Invite a group of students to attend the Fifth Dimension (treatment group) and for each student identify a non-attending student who attained the same pretest score (comparison group). Administer pretests and posttest to both groups, compute pretest-to-posttest changes on each kind of test for each student, and determine whether the mean pretest-to-posttest change is greater for the treatment group than the comparison group (e.g., using t-test for related measures, analysis of covariance, or analysis of variance with pretest score as a between subjects factor).
3. *Comparing posttest scores with matching based on student characteristics.* This is the same as method 1 except that you only administer posttests to each group and you determine whether the mean posttest score on each test is greater for the treatment group than the comparison group. This method can be used when pretesting is not feasible.

4. *Comparing posttest scores with matching based on pretest score.* This is the same as method 2 except you determine whether the mean posttest score on each test is greater for the treatment group than for the comparison group.
5. *Comparing test scores of inexperienced and experienced participants.* Administer tests to an inexperienced group of participants (i.e., who are tested on their first visit but who eventually attend some criterion number of times such as 15 visits) and an experienced group of participants (i.e., who are tested after attending for some criterion number such as 15 visits). For each test, determine whether the mean score for the experienced group is greater than the inexperienced group. This method can be used when no non-attending comparison group is available, although it is important that the inexperienced group consist of students who eventually attended the criterion number of visits and the students in each group be randomly selected.

Who to assess. The assessments are intended for elementary school age children. We recommend focusing on students who might not otherwise have had access to computer technology in an informal setting. We also recommend focusing on girls, language minority students, and ethnic minority students.

When to assess. We recommend testing at the beginning of the academic year and at the end of the academic year. If possible, longer-term follow-ups would be useful. We also recommend setting the criterion for Fifth Dimension participation at a minimum of 10 to 20 visits throughout the year, and setting the criterion for non-participation at 0 visits. Previous research on cognitive process instruction has shown that substantial effects can be produced after as little as 10-hours of exposure

In summary, our goal is limited -- namely to help you develop a traditional assessment of the cognitive consequences of participating in a Fifth Dimension program. By focusing on basic literacy and problem-solving skills, we may miss important aspects of students' social and motivational growth which are also worthy of study. In choosing to administer paper-and-pencil tests in school or school-like settings, we may miss a rich source of information about how students actually perform in a Fifth Dimension setting. By matching students so tightly on relevant characteristics, we lose data for students who can not be matched. In focusing on children who participate in the Fifth Dimension, we may miss important changes in adults who work with the children. In choosing to focus on short-term changes, we may miss the larger picture that can be afforded through longitudinal study. In short, an assessment of participants' cognitive changes is a central part of assessing a Fifth Dimension site but it can be supplemented in light of the limitations listed above.