

***Assessing the Learning of Students with  
Disabilities in Informal Education Addendum***

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by

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Prof. Holly K. Ault, Major Advisor

This report represents the work of a WPI undergraduate student  
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## **Abstract**

This is an addendum for a previously submitted IQP(Interactive Qualifying Project). The previous IQP, the *Assessing the Learning of Students with Disabilities in Informal Education*, created a reference matrix, known as the SMIRF (Suggestions Matrix Incorporating Results from Findings) for assessment in informal education. In order to increase its utility to educators who may reference it, however, a demonstration of its use was deemed necessary. This addendum provides examples of use based on a case study. By creating a set of example assessments while using the SMIRF, this addendum seeks to enhance the utility and applicability of the SMIRF matrix.

## Acknowledgements

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I actually feel I should thank you once more professor for the rare and wonderful gift you bestowed upon me. Normally, when a project is done, it's over, finished, and you can't go back to add to it. You gave me the honor of being able to go back and pick that one thing that would have made the diamond sparkle all the more. I only hope that when I do my MQP that my advisor is as motivating, yet also as understanding and helpful as you were. Thank you.

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## **Introduction**

*Assessing Student Learning in Informal Education*, an Interactive Qualifying Project (IQP) completed at Worcester Polytechnic Institute (WPI), sought to provide informal educators, formal educators, and future IQP groups a foundation to use for porting assessment to informal education (Mackendrick et al, 2008). The main product of the IQP was the Suggestions Matrix Incorporating Results from Findings (SMIRF), for use by formal, special, and informal educators at different times of an informal educational experience.

The SMIRF itself is a useful tool; it creates a rudimentary framework with which to shape assessments for use in informal education. Any tool benefits from demonstration in order to show its proper use. The demonstration of the SMIRF is a set of example assessments, created by consulting the SMIRF, and is the primary contribution of this addendum.

The addendum will consist first of a brief overview of the original IQP. More specifically, the literature review, findings, and conclusions will be reviewed. After the review, the addendum will present potential ways in which the SMIRF could be used. Following the potential uses, there will be a brief conclusion, followed by a copy of the original SMIRF matrix for quick reference.

## **Overview of the Assessment IQP**

The Suggestions Matrix, the final product of the IQP, is a simple guide for bringing assessment into informal education. The matrix itself takes up a single page of the document. The supporting information for the SMIRF, however, is encompassed in nearly 100 pages, not including appendices. The information supporting the SMIRF is the primary concern of this section, as it is essential to properly understanding the SMIRF. This section of the addendum will briefly examine the literature review, findings and results sections of the IQP.

## **Literature Review**

The Literature Review section of the IQP consists of several sections, including a general assessment section, a section concerning Universal Design, an accommodations section and a section concerning relevant laws.

The Assessment section of the IQP discusses the purpose and execution of assessment. Assessment is how educators fulfill the need for a method of collecting data on student learning. Educators need to collect such data because they must both ensure that students have mastered the material and know where students are having difficulty. Assessment provides educators with the tools

necessary for acquiring such information.

The utility of assessment not only lies in its power to collect data. Assessment also provides educators a means by which to track data. Educators thus use assessment to prove that their curricula are compliant with applicable regulations and ordinances of their state, local, and national governments. Simultaneously, because of the capacity of assessment to track data, it can be used to find where students are having misconceptions and where curricula require improvement.

Two primary uses of assessment, to track student mastery and to diagnose curricula faults, are each answered by their own form of assessment. Summative assessment is that which examines student mastery, where formative assessment seeks to improve the quality of a student's education. The divisions of assessment do not end with formative versus summative. Another set of divisions, traditional versus authentic are also discussed in the literature review.

The difference between authentic and traditional assessment is how they approach the examination of student learning. Traditional assessment uses simplified hypothetical problems in order to examine student abilities. Authentic assessment uses more open ended and more realistic problems which may spur students to use what they already know. Traditional assessment, in a sense, tests if a student knows the facts, where authentic assessment can challenge students to use their knowledge. (Mueller, 2008)

An important component of the SMIRF is its use of Bloom's Taxonomy. The taxonomy is explained in detail in the assessment section of the literature review. The Taxonomy is one of the first and most popular measures of the level of student understanding available. The Taxonomy consists of six levels; *Knowledge*, *Comprehension*, *Application*, *Analysis*, *Synthesis*, and *Evaluation*. The taxonomy cites *Knowledge* and *Comprehension* as knowing a fact and understanding its meaning respectively. *Application* is the ability to apply a fact to a situation. *Analysis* is the ability to use the fact to dissect a problem or issue into smaller portions. *Synthesis* is the ability to use a fact in order to create something, and lastly, *Evaluation* is the ability to use a fact to make an informed and sound judgment. (Forehand, 2005)

The assessment section also reviews some of the tools available to educators to examine student learning. Amongst these tools are essays and multiple choice questions, amongst other assessment methods. Essays can examine student writing style, research capacities, and thought processes. Essays can also be formative by providing extensive feedback for students. Multiple choice questions can also be used as a formative assessment, but lack the ability to measure the depth of student understanding that the essay can probe. Multiple choice questions, however, are far more expedient for both educators and students. (Brown, 2001)

The literature review also examined applicable laws and educational reform. The laws covered were the No Child Left Behind act (NCLB), the Americans with Disabilities Act (ADA), the Elementary and Secondary Education Act (ESEA), and the Individuals with Disabilities Education Act (IDEA). The ADA applies to a broad spectrum of social settings and public areas, and gives the government authority to enforce equal treatment for those with disabilities under the 14<sup>th</sup> amendment. The NCLB is optional, but gives federal funding to schools that participate. The NCLB requires that participating schools make progress towards the goal of having as many students proficient in core academics as possible by 2014. The IDEA requires that schools create an education plan for students with special needs to ensure that those students are adequately served. The ESEA, the first of the laws created, gave funding to schools which met government standards. (NCLB, 2002; ADA, 2008)

After the laws were explained, several arguments concerning their utility were identified. One argument is that special education spending will not gain a justifiable return to the economy. Another argument is that the standards set by the government are neither realistic nor attainable. The literature review also cites that education personnel were not intimately involved with the creation of the NCLB, among other laws. The educators, having interest in the law, according to some, ought to have been consulted in the drafting of NCLB. The review finishes the discussion by stating that governments can only go so far in attaining good education for students. (Cizek, 1999; Schmidt, 2008)

After a review of laws, the literature review provides a brief description of the disabilities faced by students and educators. The disabilities discussed are sorted into sensory, physical, and learning types. Sensory disabilities, such as blindness and deafness, impair senses. Physical disabilities, like paraplegia or cerebral palsy, may inhibit movement. Learning disabilities interfere with the thought processes of an individual, with examples such as ADHD and Autism.

Following a review of the disabilities, the current practices in assessing students with disabilities was touched upon. There are a variety of accommodations available for a varied number of students. For those unable to write, scribes are available. For those with reading difficulties, such accommodations as paraphrasing, or rewording the instructions, are available. (Kortez, 1997)

The accommodations section led into the Universal Design section. Universal Design is the concept of designing something so that the maximum amount of users can use it. Its application to education condenses the original principles into the following: providing multiple forms of assessment, allowing for multiple forms of response, and catering to student interests. (Zeff, 2007)

With the literature review summarized, this addendum will now delve into the findings of the team. The methodology is not covered here as any necessary information concerning methods is discussed in the findings. The findings provide the basis of the SMIRF, which in turn is demonstrated

by this addendum.

## **Summary of Findings**

The SMIRF IQP findings section starts with the information gained from applicable state standards. Bloom's Taxonomy is used to compare the state information to the informal educational objectives, which are cited in the latter half of the first section. By evaluating both state and informal learning objectives, the two sets of objectives could be compared to the Bloom's Taxonomy.

It was found that informal institutions tended to model their programs based on objectives of their applicable states. Zoos Victoria, for example, used the Victorian Essential Learning Standards, while those institutions in Massachusetts, U.S.A, used the Massachusetts Science Frameworks. The standards and the informal objectives found that both sets attained the second level of the taxonomy, comprehension, on a regular basis. Such a finding substantiates the claim that informal institutions are aligned with those of their jurisdiction. Interviews, discussed later in the findings, confirmed this finding. (VCAA, 2007; Massachusetts DOE, 2000)

After learning objectives and standards were probed, the findings moved towards the connections between informal and formal educational curricula. Formal educators stated that field trips were connected to their curricula, and used to stimulate student interest. Special educators, also used field trips to teach, but their focus was on proper social interactions and good behavior. Informal educators' goals were to engage students and to promote their learning. Another goal of informal educators was to provide a low stress environment to better cater to students.

After the goals of educators were examined, the findings examined the pre-trip support informal educators offered to their formal counterparts. Each informal educator interviewed indicated that they offered some pre-trip support to formal educators. While there were many forms of delivery available, informal educators stated that it was the formal educator's responsibility to seek support. The team concluded that support should be accessible to and useful for students with a wide range of abilities. The need of formal educators and informal educators to discuss accommodations for students was also discussed.

The findings followed the pre-trip discussion with an examination of post trip activities. Specifically, the use of post trip evaluation and feedback for informal educators was explored. Informal educators conducted limited assessment of students after their programs. Formal educators, in contrast, did not always conduct post trip assessments, but expressed a willingness to do so if informal educators provided assessments to use. Formal educators were also found to be willing to give informal educators feedback on their programs for exhibit improvement.



Along with examining the placement of assessment after a field trip, the findings examined a family of assessment techniques called Classroom Assessment Techniques, or CAT's for short. The CAT's were characterized by brevity of student time and effort. While some CAT's are more student friendly than others, they provide a potential family of assessments for informal educators. The minute paper, for example, takes about minute for students to fill out. The paper is filled out by students, answering a question about what they believe to be the most important thing they learned, or where the teacher could improve. The questions could also be tailored towards exhibit improvement, potentially an invaluable tool for informal educators. (Angelo, 1993)

After examining CAT's, mainstream and special education schools were compared. Like mainstream schools, specialized schools brought their students on field trips relevant to the school curricula. Another similarity is that specialist and mainstream schools use many of the same assessment techniques, such as quizzes and essays. The difference in assessment between the two is that specialist schools cater extensively to individual students' needs, while mainstream schools are not so personalized.

The curricula of special education schools were found to be oriented towards giving students social skills along with academics. The specialist schools also used a great deal of technology in their courses. One particular special education site required students to have laptop computers in order to take advantage of various computer based educational tools. When asked about the laptop's use in mainstream education, the special educator interviewed referred to the high cost of laptop computers as a prohibiting factor.

The findings also explored methods which informal educators use to evaluate their exhibits and programs. Of importance to that evaluation is the use of data acquisition methods. While not the only information found concerning program evaluation, the data acquisition methods were used as a starting point for the findings.

There are five general types of data acquisition methods; questionnaires, observation, interviews, tests, and document research. Questionnaires are small assessments comprised of several assessment methods, such as multiple choice questions and short answer questions. Observation is the examination of student behavior to draw conclusions on student learning. Observation was determined to be most suited to assessment of students during the trip, as it does not require student time to conduct. The use of interviews and tests is frowned upon by informal educators due to the anxiety they create for students. The last type of data acquisition method, document research, uses previous records and other statistics to make inferences about previous and current programs.

Following the examination of data acquisition methods, the information gathered from several

interviews was summarized. Informal educators use student motivation and freedom as their strength, thus they avoid the use of assessment in evaluating existing programs. While interviews, focus groups, and other research are used to design exhibits, the exhibit experience itself is not examined with such methods. Several informal education sites send questionnaires to school faculty for their evaluation, but the evaluation of the students during the visit is minimized.

Informal educator interviewees report that evaluation is used rather than assessment. Assessment is used to gain data on student learning, not accessibility issues, profitability, popularity, or other important variables for the informal educator. The need to measure variables that assessment itself cannot cover is a compelling reason to avoid assessment as an informal educator. While assessment is not useless to informal educators, its uses are limited. Evaluation examines a program or exhibit in order to find areas in which it needs improvement. Unlike assessment, which looks at student learning, evaluation uses a myriad of available resources, such as records, focus groups, and interviews, in order to measure the effectiveness of an exhibit.

Following the discussion of evaluation the findings researched the practice of informal educators concerning accommodations for students with disabilities. The informal educators who were interviewed provided several accommodations for visitors with disabilities. Velcro boards for those unable to verbally communicate, sign language interpreters for those who sign, Braille for the blind, and floor personnel were all examples cited by the interviewees.

## **Summary of Results**

The results section of the IQP presents a set of recommendations for formal, special, and informal educators to both improve the utility of informal education, and to assist in porting assessment to informal education. In order to better organize the results, the time period of informal education was divided into three sections. The first section, pre-trip, discusses what should be done by both informal and formal educators before the actual excursion. The during-trip section is for times during the actual excursion itself, and the post-trip section is for after the students return to the formal education facility.

The results first advise educators to prepare students for their field trips. The preparation examined consists of establishing a baseline for assessments, and discussion amongst involved educators concerning student accommodations.

The first method the SMIRF explores for setting a baseline is the use of information packets, distributed by informal educators. The information packets contain knowledge that the students may find interesting, or may need in order to gain optimal benefit from the informal educational experience. The information packets can also set a baseline of student knowledge for their trip. Information packets

also allow students with disabilities to better prepare themselves for the field trip by knowing what the experience will entail.

The results pose an alternative method from information packets by which a baseline can be established. Formal educators could provide informal educators with the data from background knowledge probes and other assessments. With the data required to establish a baseline, informal and formal educators are able to acquire accurate information on student progress. Additionally, assessments can be used to provoke thought about the material, improving student understanding and heightening their interest.

In addition to setting a baseline for assessment, the SMIRF also advises informal educators to make their material accessible to students with disabilities. While the SMIRF itself does not delve into how such a goal should be accomplished, the report does make reference to two other IQPs on the subject of informal education and accessibility. The reader is advised to consult the PAR IQP and the SAM IQP for further information regarding accommodating students. (Gilde et al. 2008; Simone et al. 2007) Furthermore, the SMIRF recommends that all educators involved in the informal experience communicate with one another concerning accommodating students with disabilities.

The results shed light on how assessment might fit best into the informal educational experience as well. One point, however, that the results clearly illustrate is that students must not feel like they're being tested. Informal educators stated that students would be deterred from freely engaging with the exhibits if they knew that they would be quizzed on them later. Such deterrence would strike at one of informal education's strengths; student motivation.

The question concerning assessment in informal environments then becomes, can assessment be utilized at all? The answer the results provide is yes. Formative assessments, unlike their summative counterparts, assess student learning and if properly used do not deter students from enjoying themselves. The reason that formative assessment is the preferred tool is its purpose- not to grade students, but to improve their learning.

The results, outside of recommending formative assessments, also indicate some tools which are suited to use in the informal environment. The first tool recommended is observation. Due to its ability to obtain data without requiring direct student input, observation has the lowest risk of impeding student learning.

The second tool that the SMIRF recommends is the minute paper. The minute paper allows students to answer a question freely, and can be used to ask questions for exhibit improvement other than what students learned. While there may be some stress on students, the educator can mitigate such effects by informing the students that the paper is only going to be used to make the experience better.

The tool that the results favor least is the questionnaire. It offers the ability to use a variety of methods, such as multiple choice and modified essay questions, as well as brevity and relatively low stress. While the questionnaire requires the most input from students, it has the ability to gather a wealth of targeted data. Data concerning specific areas of interest to the educator can be asked, and more deeply probed, than with solely a minute paper.

Besides recommending some tools for educators, the SMIRF explores the responsibilities of formal educators in the informal realm. The first thing that the SMIRF advises formal educators to do is bring extra chaperones to accompany students with disabilities. Along with helping to conduct observations, the chaperones can assist students with learning and teachers with supervision.

The results also advise that formal educators follow similar rules to those of informal educators as far as assessment is concerned. Assessment runs the risk, when improperly designed, of hampering student learning. The results also show that the formal educators' duties decrease during the informal excursion, due to the fact that presentation of the informal education lesson is the role of the informal educator.

With the role of formal educators in informal education discussed, the SMIRF examines what should be done after a trip. The SMIRF first recommends that formal educators take advantage of the opportunity to administer a small questionnaire. The SMIRF also suggests to informal educators that they distribute post-trip material, including questionnaires for students and requests for feedback from educators.

The SMIRF recommends the use of both formal educator feedback and assessments from informal educators. Such practice is recommended as it will help to keep students engaged, and promote communication amongst educators. Informal educators will be able to better evaluate their programs, formal educators will be able to assess student learning gains, and the students stand to learn more from the feedback provided.

With its recommendations supported and stated, the report organizes them into a small matrix. The matrix itself, the SMIRF (Suggestions Matrix Incorporating Results from Findings) is organized by educator and a time relative to the field trip. To find appropriate suggestions, the educators find their column, and the appropriate row for time, and read the suggestions contained in the cell.

The matrix is followed by additional information about some concerns of educators. The first of these concerns is ensuring that students do not feel like they are being tested. This was supported by interviewees and some accompanying literature. The report also indicated that the assessment of specific students would have to be done in such a way that student anonymity was retained. It suggested a numbering system, capable of identifying students with disabilities, be used.

The report ends with a conclusion where the utility of the SMIRF is explored. While that exploration is not as in depth as the following assessments presented here, it does demonstrate that the SMIRF stands to lay the foundations of future work.

### ***Sample Assessments Utilizing the SMIRF***

With the summary of this IQP's main document accomplished, its utility can now be explored by using it for its intended purpose. In this section, the SMIRF will be consulted to create a variety of assessments for some educational programs. The educational programs being used to create the assessments will first be described, and any assessments that are designed for them will be addressed afterwards.

There are various reasons for conducting this exercise. The first is to test the SMIRF and prove its utility. Another is to demonstrate its proper application, thus assisting educators in its use. The SMIRF is a guide by which assessments can be created, and this section of the addendum is meant to show the value of such a guide.

The choice of programs to assess here is a set of programs from Australia's Zoos Victoria. The rationale is to provide relevant information to other IQPs which will likely utilize the SMIRF. Another benefit is the amount of information available on the Zoos Victoria website concerning their programs.

### **Program One- Furs, Feathers, Scales and Skin**

*Used to create a Background Knowledge Probe and Minute Papers*

The program, Furs, Feathers, Scales and Skin, is held at Zoos Victoria's Melbourne Zoo. The program is meant to teach young children, between ages 6-9 about the many coverings of animals. The Zoos Victoria website has three documents available for educators to examine. One of the documents is a VELS sheet, which shows which state standards are applicable to the program. The Student Trail gives an educator a suggested itinerary for planning a day trip to compliment the program. The information most relevant to the addendum is the Teacher Notes, available on the same web page. (Zoos Victoria; Fur, Feathers, Scales, Skin, 2009;VCAA 2007)

The Teacher Notes contain a variety of activities for students, as well as information that educators can present to the children. The Teacher Notes also give the aims and objectives of the program, such as "establish an awareness of animal classification systems."(Zoos Victoria; Fur, Feathers, Scales, Skin, 2009, page 3). The objectives give educators an idea of what the program itself will entail, which in turn will influence how they might teach the information provided to the students.

The information accompanying the small descriptor of the program is useful to educators for

shaping pre- and post-trip curricula. The information is also useful for deciding whether or not to use the program at all. The information concerns four types of animal covering, fur, feathers, scales, and skin. The information is presented in such a way that the teacher could reproduce it and have the students read it, thus gaining factual knowledge, and providing a background for the program. While this is certainly a good use of the information, it is not necessarily accessible to students who have disabilities that make reading difficult. Furthermore, such a use could make assessments such as a background knowledge probe (BKP) difficult, unless the BKP was planned in advance.

A background knowledge probe is a simple assessment used to gather information on what a student knows before a lesson or unit. The BKP can be used to direct the lesson by identifying what can be glanced over and what needs further discussion. Another purpose, however, is to evaluate the effectiveness of a program. If a BKP is done to gather information on what a student knew going into an experience, and their knowledge is assessed after the experience, the effectiveness of that experience can be examined.

The information provided by the teacher notes for the program lends itself well to the creation of a background knowledge probe. Due to that fact, this program will be used to create a BKP, for which the SMIRF will be consulted. The BKP here is for pre-trip use by a formal educator, and is disseminated by the informal educator. It can also be of use to informal educators for program evaluation, which makes a BKP useful for both educators. To maximize the utility of feedback for students with disabilities, the disabilities need to be tracked, while still retaining student anonymity. This will be addressed below in the creation of the BKP.

The BKP proposed below would be administered before the educational unit which uses the Furs, Feathers, Scales and Skin program. It is to assess the field trip experience itself, and the post-trip assessment that accompanies it is to be used a few days after the trip. The short delay will help to mitigate the effect of student memorization. A numbering system will be used in this case to track the experience of each student.

The BKP in this example will take the form of a short questionnaire, utilizing a set of short answer questions and some true-false questions. The post trip assessment will take a similar form, and is shown after the first BKP questionnaire. The last page of the BKP setup will be the numbering system sheet. By matching two numbers to the student, and commenting on any disabilities the student has, disabilities can be tracked and thus better analyzed.

**Background Knowledge Probe  
Questionnaire**

No. 14

Please fill out this small questionnaire so your teacher can mail it back to us. It will help us make the zoo more fun

How do animals use fur?

How do feathers help birds to live?

What do the bright colors of some frogs mean?

What does a frog's skin do?

What do birds use bright colored feathers for?

True or False

Whales have some fur	T	F
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There are six kinds of feathers	T	F
---------------------------------	---	---

Lizards shed their scales	T	F
---------------------------	---	---

Frogs shed their skin	T	F
-----------------------	---	---

Frogs can change their skin color	T	F
-----------------------------------	---	---

Give a fact you know about an animal's covering. It can be any animal.

Thank you for filling this out. It will help us to make the zoo more fun and educational.

## Post-trip Questionnaire

No. 37

Hello again. We hope you enjoyed your trip to our zoo, and would like to ask you a few questions about it. If you would fill out the questions below, it would really help us in making the zoo better for everyone.

How many kinds of animal coverings are there?

1      2      3      4      5      6      7      8

How many kinds of feathers are there?

1      2      3      4      5      6

True or false

Frogs can “breathe” through their skin                      T      F

Birds can use their feathers to stay warm  
or to keep cool    T      F

Whales have some fur    T      F

How do reptiles use their scales?

How are snake and lizard scales different?

How do frogs use their skin?

How does fur help animals to live?

What are some of the functions of an animal’s covering?

What was the neatest thing you learned?

Thank you for filling this out. It will help us to make the zoo better for everyone.



## Assessment Tracking Sheet

Please use this sheet to track student assessments. For each individual student, write the numbers of their pre-trip assessment and their post trip assessment next to each other, along with any special considerations they have. This will help us to track data and better use it for program improvement. Thank you.

[illegible]

The assessment is designed to collect some information on what the students know before the field trip experience. The objective of the assessment is to create a baseline for student knowledge. The numbers in the upper right hand corners are used to track students' answers and correlate them to each other. Educators choosing to use this assessment should also inform their students that it is not for grading purposes, and the zoo only wants to improve their programs. An introduction written by the informal educator would be sufficient. While the BKP and corresponding post-trip assessment can help an educator to instruct, it is not meant to test student mastery.

The BKP and post assessment above have small introductions to help put the students at ease. They are an important part of the assessments, as they reduce student stress, and tell the students that the tests aren't for grading them. As recommended above, educators should reinforce that feeling to keep students at ease, and provide an introduction of their own. By providing a numbering system, the assessments are able to be correlated to the students who took them, while no individual student can be identified. Such correlated data can be used to bring about disability specific improvements, and the issue of anonymity is cleanly dealt with.

While a BKP and a post trip assessment can greatly help both educators, they are not always practical due to time constraints or other factors. In this case, a minute paper can be of use. The minute paper is a brief assessment which can also be used to determine the effectiveness of a program. Because of its small size, it can be used where questionnaires are ill advised. Below is a minute paper that an informal educator could use immediately after most programs.

### **Minute Paper**

What was the neatest thing you learned?

What confused you?

What did you already know?

Thanks!

The "Thanks!" is to help ease tensions. To correlate data, informal educators could number the students by observation, and record their disabilities later. Other systems could be used to correlate assessments to the students who are assessed, but as the SMIRF recommends, it should still allow for

student anonymity. The Minute paper above is akin to a “Muddiest Point” minute paper. The example below is program specific. (Angelo et al. 1993)

### **Minute Paper**

What kinds of feathers are there?

How many kinds of fur are there?

Thanks!

The program provides answers to all of these questions. Each of the questions here could be exchanged for similar questions on different facts taught by the program. The point of this is to find which information students are having the most difficult time with. While the first minute paper could be used to rate the entirety of a presentation, this minute paper could be used to examine a piece of a program. Such assessments could be useful for fine tuning a program or evaluating the skills of a particular informal instructor in a particular area. Minute papers are extremely flexible, and their limits are only in the questions that the educator asks.

The assessments used in this program also share an additional trait. While assessment can be used for testing mastery, these assessments are used for program evaluation. Testing student mastery is not advised by the SMIRF, as such assessments lower student motivation. Formative assessments such as those above are permissible, so long as students know that they are for program evaluation, and not for grading them.

With a few trial assessments created for the Fur, Feathers, Scales and Skin program, a brief “Case Study” of a potential student's experience can be examined. In this case, the student is named Johny, and while he has no permanent disability, he has recently been bitten by a funnel web spider, and is in a wheelchair until his foot and leg heal. It is important to note that Johny only sees the assessments presented to him. He does not know that the assessments are correlated, but if he were to ask why the assessments were numbered, his instructor could tell him the truth without influencing his answers, or violating his privacy rights.

Say that Johny knows nothing of birds, and guesses there are six kinds of feather. The BKP would show that he answered true when asked whether there were six kinds of feather. Assuming he remembers what is taught, he will put down four kinds of feather for the post assessment questions

relating to feathers. Say he knows that amphibian skin can sometimes excrete poison, and puts that down as his neat fact for the BKP. For the post trip assessment (PTA) he can put down that amphibians skin can change color, or that amphibians shed their skin.

Say, however, that while everyone else got to pet the animals, Johnny was not able to do so due to the wheelchair. The difference can be seen in his descriptions of snakes vs reptiles, and correlated to the fact that he is currently in a wheelchair. The correlation is based on the assessment correlation sheet given to instructors. The entry for Johnny may look something like this

7      18      Currently in wheelchair due to spider bite.

These data could indicate to zoo personnel that their exhibits suffer from an accessibility problem. With the use of methods recommended by other IQP's, such as the PAR and SAM, the informal educator could improve accessibility, and thus improve education (Gilde et al. 2008; Simone et al. 2007). Furthermore, they could justify the budgeting for renovations that would improve accessibility by using similar data. By consulting the SMIRF, the informal educator knows that it is advisable to give the formal educator such a set of assessments. If the educator has consulted the SMIRF, they will know that it is a good idea to return the test to the informal educator. Furthermore, with a correspondence, other benefits for both formal and informal institutions can arise.

## **Eat or be Eaten Program**

### *Used to Create a Questionnaire*

The next assessment type that will be demonstrated will be a questionnaire, to be completed by students immediately following a program. The SMIRF would advise against this, but there may be instances where such assessment is necessary. A questionnaire, based on the Eat or be Eaten program at Werribee Zoo, is discussed next.

The Eat or be Eaten program is a program offered at the Werribee zoo. The program starts with a tour, followed by an informational session. During the tour, the students learn about various animal adaptations and how those adaptations aid in survival. The program's information session, after the tour, features animal droppings and animal tracks, as well as other items for students to examine. (Zoos Victoria, Eat or be Eaten, 2009)

The zoo offers pre-trip material for the program, which contains a list of animals and facts about them, as well as various characteristics of animal adaptations. The characteristics cited include the structure of their skulls, as well as a diagram of a cheetah with some of its features pointed out as

adaptations. This program, like Fur, Feathers, Scales and Skin, comes with its own form of assessment, an activity sheet called the “Student Trail”. In this case, the student trail was used to glean what information was being taught and conveyed in order to create the questionnaire.

The questionnaire in this case is created by the formal educator, and is going to be used as part of a unit on observational skills. The educator, unsure of where to fit in their assessment, consults the SMIRF. The teacher matches up the time of the assessment, during trip, and finds the applicable column for their situation, formal educators. In their case, none of their students has any disabilities or learning differences, an application of the SMIRF in a more mainstream context. The SMIRF offers two suggestions: to bring extra chaperones, and to use observation. The SMIRF IQP does designate that the questionnaire is a suitable assessment for use during a trip, but suggests that it is the least student friendly of those it explores. Assuming that the educator follows these guidelines, and reads the SMIRF, an assessment will be designed to encourage learning and interest. The questionnaire will also avoid taxing students to the point of dissuading them from the experience.

The Student Trail is worded to encourage observation and learning. The Student Trail asks students to fill it in as they go throughout the zoo, learning about animals and their adaptations. It does not explicitly say it is for program improvement, but it could be used for such a purpose. It allows students some leeway in filling it in, as each question has several correct answers. There are also questions that tie into activities done during the “discovery session” of the program, where students get to interact with various items related to adaptations. The Student Trail limits itself to being more of a directed note pad or observation checklist for students to use.

The educator, in this situation, wants to give the students something smaller in terms of paper used, as well as something that measures how observant students are. Their goal is to have the students find information on the animals, and to practice observation skills they have been studying in class, such as note taking and listening attentively in this case.

## Questionnaire

Name\_\_\_\_\_

At our trip to the zoo, we are going to practice the observation skills we reviewed in class. This won't be graded, but I will collect them to see what I need to help you with. If you need any help, just ask me or your chaperone.

What things does a lion have that helps it to live?

What interesting facts about lions did you learn?

What's a kudu? What does it look like?

What does a kudu do?

When you examine the animal skulls, what looks interesting?

When you examine animal scat, how can you tell what type of animal it came from?

Do you have any ideas for in class activities we could do to practice our observation skills?

The questions above allow for some flexibility in answers, and also offer students the chance to make recommendations to the teacher for classroom activities. They are also set up to get students to observe some of the animals. Despite adhering fairly well to the SMIRF's guideline that the assessment be fairly low stress on students, and that questions should promote student inquiry, a questionnaire may still tax students.

The questionnaire above is a set of short answer questions. They are designed to be as unobtrusive as possible, while still examining student observation skills. The questionnaire is arguably the least student friendly form of assessment. It demands the most from students, and can also demand a great deal from educators who try to keep student motivation in consideration.

## **African Experience Program at Werribee Zoo**

*Used to create an observation checklist*

The most student friendly form of assessment for an informal experience, according to the SMIRF, is observation. By observing student behaviors, it is possible to gain data on a wide variety of useful information. Interest can be assessed, barriers to accessibility easily identified, and student knowledge can be probed. The SMIRF recommends having several chaperones for many purposes. Freeing up teachers to conduct their own observations, as well as having extra personnel to conduct observations are amongst the reasons for those recommendations.

A program that lends itself well to observation is the African Experience program, also offered by the Werribee Zoo. The nature of the program, an interactive role-play, is the reason it lends itself to observation. Not only would other assessments damage the role-play element, but the damage done to the role-play element would greatly diminish the learning experience. (Zoos Victoria, African Experience, 2009)

In the role-play, students first embark on a safari as a set of characters. The safari goes well until the end, where news of a poached rhino makes it to their tour bus, and they are informed that they are all suspects. From there, they discuss motives of the other characters, while also trying to vindicate themselves. The goal of the experience is for students to learn about one of the more intricate social issues confronting the world today, poaching. The information packet available online gives information about the program, as well as activities that educators can use to enhance student learning. The packet has suggestions for research exercises, as well as activities for after the trip.

With such a program, observation of students can yield plentiful data for program evaluation. Observation can also be used to see if students are having difficulties with some aspects of the program, and whether or not the students are learning. Observation can also be used to determine if the

students comprehend the material being presented. Observation is a useful tool for informal education because it requires nothing of the students, other than a line of sight to them from the observer.

For this theoretical case, the observation checklist will be provided by the informal educator to find areas where their programs can improve. Also, for this case, there will be a student with social difficulties, prone to scare easily in some social situations, in the group. There will also be a student with hearing impairments in the group.

There are some recommendations that the SMIRF holds for this situation. The informal educator can look up their column and information for during the trip. The formal educator can also look up information under the special column. The special educator column is for educators with students who have special needs, while the formal educator column applies to all formal educators.

To the formal educator, the SMIRF recommends that, during the trip, they help with accommodating the needs of their students. To that end, the educator has taken the liberty of providing an extra chaperone for both the socially challenged and hearing impaired students. The formal educator, also recognizing the potential for the socially challenged student to be frightened in the role-play, has explained how the tour will go to the student. Such an accommodation can be done, while still maintaining the surprise for the rest of the students.

Before the trip, the SMIRF recommends that the informal educator be informed about the special needs of the two students. Because they know that the socially challenged student is prone to be frightened by some of the elements in the role-play, the informal educators may alter some elements of their program to better cater to the student's needs. Furthermore, the informal educator may alter certain elements of the environment to better accommodate the hearing impaired student.

The SMIRF's primary recommendation that assessments be kept low stress for students is followed very well by observation. Furthermore, the informal educator can conduct the observation and share findings with the formal educator. By doing the observation themselves, the informal educators comply with the suggestion of the SMIRF that they do not overload the formal educators with work.

The observation tactic taken for the assessment here is that of a structured observation sheet. The sheet is designed to guide informal educators to look for certain signs of student learning. The interpretations available for the data collected below are numerous, and are briefly discussed after the assessment below.



## Observational Check List

How many students in the group are asking questions?

Few		Half		Many
1	2	3	4	5

How many students, when asked questions, are answering?

Few		Half		Many
1	2	3	4	5

Are students answering questions posed by their fellow students?

Few		Half		Many
1	2	3	4	5

Are any students having difficulty with the activities of the safari?

Why?

Rate the overall strength of the reaction of the group when they were accused

Apathetic		Mild		Enthusiastic
1	2	3	4	5

Are any students getting “into character” with the discussion?

Few		Half		All
1	2	3	4	5

How many members of the group appear to be having fun?

Few		Half		All
1	2	3	4	5

Are any students having difficulty with the discussion?

Why?

Additional Notes

The majority of the observation questions above are geared towards rating the reactions of the group. In order to gain more specific data, however, two questions require more detailed input. The informal educator may answer “Yes” for the question concerning difficulty with the safari portion of the program. The difficulty could be with the hearing impaired student, who will be called Marsha. Marsha could still be receiving assistance from an interpreter, but the environment of a tour bus could be impairing her ability to see what the informal instructor is doing. An observer could note this down, and the data used to improve the experience for future students.

The majority of questions for this checklist are involved in the discussions between educator and students. They are meant to determine if students are asking questions and thinking, or just going through the motions. If the students aren't asking questions, and are reluctant to answer, they may find the trip uninteresting, or be distracted. There are other reasons for such behavior as well, but the likely cause is either a lack of interest, or a lack of understanding.

In contrast to a lack of questions, an influx of student input to the informal educator suggests a great deal of interest. The interest can also be a sign of knowledge and learning, especially if some students either give the answers, or pose answers of their own, based on the information being taught. By participating, the students demonstrate that they are not only paying attention, but learning.

The questions that gauge the reaction of the students at being fingered as suspects in the activity are also an indicator of student participation. An enthusiastic reaction would be signified by a cocking of heads, several looks, some chatter amongst the students, and such. An enthusiastic reaction can also mean the students sitting attentively, focusing on the educator who is playing the role of the “customs officer”. An apathetic reaction is demonstrated by students just sitting there, going through the motions, and looking bored.

The questions which gauge student enjoyment allow the informal educators to determine if they are creating a program which students will remember, as well as a program that they are paying attention too. The last questions of the observation sheet, those concerning difficulties with the discussion portion of the program, as well as asking for notes, can again be used to track accessibility issues. If the informal educator is informed of a student’s condition, they can track the student by their appearance and enter data on the student, thus correlating data to student disability types. Such data correlation would allow targeted improvement for the experiences of students with specific disabilities. By using observation, however, tracking of individual students is not necessary, as those with disabilities can be directly examined and their experiences explored for difficulties.

## **Conclusion**

The previous three assessments were created to demonstrate the utility of the SMIRF matrix. They have also demonstrated the proper use of the tool by example. This addendum contributes an important set of data to the original *Assessing Learning of Students with Disabilities in Informal Education*. With these assessments to demonstrate its use, the SMIRF matrix now stands to both be used properly as an educational tool as well as to be seen as an educational tool. The examples here give the SMIRF demonstrate a variety of situations and uses of the matrix. This addendum, in conjunction with the original report, will offer the reader useful insight on the proper use of the SMIRF, as well as its place in educational use.

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## **5.5 The *SMIRF***

To summarize the material presented in this chapter, a suggestions matrix was created for all educators. The Suggestions Matrix Incorporating Results from Findings (SMIRF) categorizes suggestions for formal, special and informal educators at different timeframes relating to an informal education trip. As previously stated in this paper, formal education encompasses both mainstream and special education therefore, special educators should also take note of the information listed under the “formal educators” column of the SMIRF. To use the SMIRF, an educator should identify the column that corresponds to their educational area and follow the suggestions listed that will allow for student assessment to occur.

**Table 4: The SMIRF**

<div>Educators</div> <div>Timeframe</div>	Formal Educators	Special Educators	Informal Educators
<b>Pre-Trip</b>	<ul style="list-style-type: none"> <li>- Use info from informal educators.</li> <li>- Establish knowledge level of students by either teaching or BKP/survey/questionnaire</li> <li>- Return pre-visit materials to informal educators</li> <li>- Check website for listing of accommodations</li> <li>- Utilize virtual tour</li> <li>- Notify informal educators about specific needs of students</li> </ul>	<ul style="list-style-type: none"> <li>- Contact informal educators regarding student needs</li> <li>- Familiarize students with informal education environment as much as possible</li> <li>- Make pre-trip material accessible to SWD</li> </ul>	<ul style="list-style-type: none"> <li>- Provide pre-visit materials to formal educators</li> <li>- Collect pre-visit materials from formal educators and enter into database for post-trip comparison</li> <li>- Consider differing student abilities and make accommodations accordingly</li> <li>- Provide easy to find information regarding accommodations on website</li> </ul>
<b>During Trip</b>	<ul style="list-style-type: none"> <li>- Bring extra chaperones so teachers can be free to do student observation</li> <li>- Record observations of student behavior</li> </ul>	<ul style="list-style-type: none"> <li>- Help informal educators in making necessary accommodations</li> </ul>	<ul style="list-style-type: none"> <li>- Do not overload teachers</li> <li>- Present any evaluation materials in a simple, quick, low-stress manner</li> <li>- Engage students in Question and Answer sessions</li> <li>- Involve students in conversation during their visit</li> <li>- Interview students and teachers if possible about their experiences during field trips</li> <li>- Provide staff for observation of students</li> </ul>
<b>Post-Trip</b>	<ul style="list-style-type: none"> <li>- Implement materials provided by informal educators</li> <li>- Provide students with inclusive follow-up activities/evaluations to keep them engaged in the informal learning experience</li> <li>- Provide feedback to informal educators</li> <li>- Maintain correspondence with informal learning centers</li> </ul>	<ul style="list-style-type: none"> <li>- Modify post-trip materials to accommodate students</li> <li>- Reward students for participating in evaluations</li> </ul>	<ul style="list-style-type: none"> <li>- Provide materials to formal educators and request timely response</li> <li>- Analyze feedback from formal educators to determine program effectiveness and make necessary changes</li> <li>- Examine observational data gathered by staff during trip</li> <li>- Maintain contact with formal educators</li> <li>- Follow-up call to thank educators for providing feedback</li> </ul>

There are other considerations to be taken into account that are not listed in the SMIRF but should be considered by all educators. First, as was supported by the findings and emphasized in the earlier results, assessments should not remind students of being tested. Whether an assessment is put to use before, during or after a program, educators should inform students that any assessment is for program improvement rather than grading. Also, when possible, assessment methods should not only provide valuable data for informal educators but serve as a viable learning opportunity for the students that will be attending a field trip. Questions can be used to provide knowledge, build interest, and encourage students to develop their own ideas while simultaneously gathering data for student assessment.

Another consideration not addressed in the SMIRF due to spatial considerations is individual student assessment. Much of the material in this paper is concerned with providing feedback on students but not specifically individual students. One obstacle to individual assessment is the factor of anonymity. All formal educators indicated that while they would be willing to provide feedback to informal educators, it would have to be anonymous with respect to the students. To produce individual student assessments, pre-trip and post-trip assessments would have to be linked to each student. This can still be done while maintaining anonymity through the use of a numbering system. In this way, students' names can be omitted in favor of numbers that will allow informal educators to properly assess individual student learning without exposing student identity. There is one caveat to this method in that there would need to be some sort of identifying factor for SWD to determine whether different skill sets affect student learning outcomes. That is, in the number system, a notation would have to be made adjacent to the numbers of SWD. The notation should identify what disability a student has so that proper assessment comparisons can be made to determine if further program improvement is needed to better accommodate students with that disability. Again, this method is clandestine in regard to student identity and necessary for disability specific program improvement.