



Introduction

The two content areas of Science and Social Studies are presented in *GED as Project* in the Learning Project and Inquiry Activities format established in *Pathways to Passing the GED: Introduction*. The stimulus for the Inquiry Activities found in this guide is primarily from the test questions in the 2002 Official GED Practice Tests for science and social studies. The organization of the Inquiry Activities moves the learners across both science and social studies and back to math, reading, and writing in an integrated approach.

As has been the case with the earlier phases of *GED as Project*, learners move through Learning Projects in a manner that incorporates previous learning into current learning. In this volume, an even more overt effort is made to integrate the materials in the Inquiries into other subject matter.

Introduction to Science and Social Studies Learning Projects and Inquiry Activities

In the GED 2002, the question items in both the science and social studies tests have an increased proportion of visual-based questions as compared with the earlier GED. Somewhere between 50 to 60 percent of the questions will include maps, charts, tables, graphs, diagrams, political cartoons, advertisements, or photographs. Many of these are taken from workplace materials such as manuals or standard forms. In many instances, the visuals complement accompanying text.

The use of these materials reflects the role of graphic images in today's world in presenting information on television and on the Internet, as well as in newspapers and manuals. These visuals are not new, but have taken on increasing importance in our information-driven age, where they serve to attract our attention and allow us to make sense of the increasing masses of information necessary to succeed in work and at home.

The first three Learning Projects in this volume are arranged around the visuals. Learning Project 1 studies graphs as they are presented in both science and social studies. All the GED tests will have bar graphs, which show amounts at specified intervals or conditions, and line graphs, which show change over time. Both these graphs have horizontal and vertical axes that establish the amounts and conditions. Learners will likely be familiar with graphs from their math studies.

The graphs of Learning Project 1 can be used as extensions of the work in math. They can also be used to lead your learners toward integrating computation into their work with graphs. Pie charts, which show the relationship of a part to the whole, while not part of this Official Practice Test, will be found on the GED.

Learning Project 2 features charts and diagrams. Complex scientific information is often diagrammed for easier access. This is especially helpful for visual learners. Both science and social studies use numerous charts and tables to give information. Typically, a table has several headings on the vertical columns and the horizontal rows. In order to find the specific information, the learner must go down a column and across a row to the point of intersection. Flowcharts, which show a process, are also tested in the GED, although none of the questions on the Official Practice Test uses one. We have included an example of a flow chart in Appendix B.

Learning Project 3 features the test items in social studies and science that have maps and pictures. Maps are particularly important, since high school graduates are expected to understand the different types of map projections, be able to locate places using scale and computing distances, interpret map symbols, and visualize what the maps mean. Further, high school graduates are expected to be able to identify continents, regions, and major population centers, as well as the oceans. In a world that increasingly uses the picture to tell the story, your learners will be expected to get more information from photographs. Not only should they use the captions and titles, they need to identify details, background features, and key subjects. The educated adult is aware that photographs and film show not only what happens, but also the point of view of the photographer, and your learners should become aware of that as well.

Probably nothing on the GED test will require an understanding of topic, context, and point of view more than the political cartoon. Each test has one, and most instructors have indicated the difficulty they pose for learners. Cartoonists display their points of view by the types of caricatures they employ and the symbols they use. Relative size can also make a potent point. Observers cannot understand a cartoon if they do not know the incident or situation being alluded to, or if they do not recognize the people being depicted. They also need to know that the cartoon is showing a bias, either favorable or not, and they should be aware of that position. The use of symbols is generally easier to convey, but, again, test takers will need to be aware of the sym-



bols used for the United States, for Canada, and for other foreign powers. Additionally, they should be familiar with the symbols of corporate America, as these, too, play a role in our everyday lives and may well be a part of a cartoon in the daily paper, if not on the test. We have included a website that has a large number of political cartoons, all found in the public domain, which you can use to develop the skills of your learners to understand these powerful examples of public opinion.

Learning Project 4 features a group of test items based on a reading passage of several paragraphs. In social studies, your learners will be expected to know about the bases of the government of the United States. A question will highlight a Supreme Court decision. Others may focus on the Constitution or the Declaration of Independence. In this Official Practice Test, the Supreme Court and the Constitution are the subjects of the group of questions found in Learning Project 4. The subject matter is the forced march of the Cherokees in the early 19th Century, and the role of Andrew Jackson in that decision. Questions focus primarily on the concept of the separation of powers and the distinct roles played by the three branches of the United States government – executive, legislative, and judicial.

Reading in the content areas requires some different strategies than reading literary genres. The vocabulary inherent to the subject needs to be understood; this is even more problematic in science than in social studies. Also, learners need to know the concepts about which they are reading in order to build the context and create understanding from the text. We begin to address this in Learning Project 4 and continue in Learning Project 5, which is the long science passage. In Appendix C, we provide examples of concept maps and charts. Instructors may have other styles they prefer to use to help their learners organize the facts contained in their reading. This is another way of integrating the materials in this volume, since the visuals show material on charts and tables, and learners will later begin to chart or map reading materials to better understand what they have read.


Learning Project 6 groups short reading passages where questions ask for supporting details from the text. In this Learning Project, we refer to the Reading volume and particularly to the first Learning Project in that volume, where learners identify the types of questions. The passages in this Learning Project are very short, but there is still good opportunity for concept mapping or charting for those learners whose learning styles make that a useful exercise.

In Learning Project 7, the short passages all require the

learners to draw conclusions from the information they read. Again we refer to the Reading volume for additional practice in dealing with questions that require drawing conclusions. These Inquiry Activities could be used as extensions for the IAs in the Reading volume that deal with drawing conclusions or vice versa.

Learning Project 8 introduces several passages that require the learners to analyze beyond the information that is provided on the test item. Problem solving skills can be used to good effect in this group. The items in this Learning Project show clearly that taking time and assessing each answer choice can be a very helpful approach, even if the learner does not know the answer.

Learning Project 9 is the final Learning Project in the book. Once again, several questions are posed about one multi-paragraph passage. The social studies passage discusses forms of government, the keystone of government study. The first Inquiry forces the learners to consider the questions only. Each question is a different type, looking for a distinct response from the learner. In the final Inquiry Activity, instructors will want to explain to learners the test-taking strategy of recognizing that questions are presented sequentially relative to the passage. This strategy was first noted in the Reading volume.

In this volume, we have added a graphic to denote when valuable tips are provided to the learners. When you see the small mortarboard graphic, [] you should encourage your learners to pay particular attention to the adjacent text. The information there will be especially helpful to them when they are taking the GED test.

The GED as Project Approach to the Content Areas

The tripartite basis for the GED test is comprised of reading, writing, and mathematics. Building these skills is the focus of most of the classroom attention. Test results in general bear out that most adults seeking their GEDs need considerable instruction and development in their math skills, and most have reason to be concerned about the writing portion of the test. The Language Arts, Reading portion of the GED test looks at the genres of reading that the high school graduate will have had considerable exposure to – drama, poetry, and fiction – and adds to these the reading that most adults are exposed to: workplace materials and reviews. *GED as Project Language Arts, Reading* focused on the strategies



that good readers incorporate into their reading; it also considered the genres and recommended or modeled strategies in relation to the genres. Good readers, of course, incorporate strategies without overt awareness of what they are doing. Less-skilled readers need to develop the strategies in order to construct meaning from the text.

Reading in the content areas is not so much about learning basic reading skills as it is about making students aware that reading is a tool for thinking and learning. In the content areas, learners need to make connections between what they know and what is presented on the page.

Nothing is more important to the making of sense of subject matter than the reader's prior knowledge. In order to learn new information, the learners must be able to bring forth what they already know and fit the new information into some sort of order, or schema (Billmeyer & Barton, 1998; Richardson & Morgan, 2003.) Readers try to make sense of the information they read by assessing it against what they already know. If their knowledge framework is well organized, they can accommodate new information readily. The more extensive their knowledge and skills in the area about which they are reading, the more they will learn and remember.

Within the framework of the GED classroom, little time is available to build extensive contexts for the information learners will need to do well on the test. In earlier forms of the GED test, a successful reader could be expected to do well in both the science and social studies sections. However, the GED 2002 has changed significantly. The inclusion of visuals and the focus on higher-level thinking skills requires that more attention be paid to assisting learners in becoming aware of how they can build their knowledge frameworks.

Concept mapping is a helpful tool for learners to use as they develop a context for what they read. This visual representation of the schema that we all develop to store and organize information is particularly useful for helping learners to become aware of how they process what they read. Ineffective readers are often unaware that there is something they should be doing to improve their understanding of what they read. As learners learn how to learn, they can begin to develop these meta-cognitive skills for themselves and become independent and successful in their own learning processes. Examples of types of concept maps are in Appendix C. Instructors are free to design their own or use other approaches.

Another facet of reading in the content areas is vocabulary. Every content area has its own specific vocabulary, particularly where it identifies important key concepts (Billmeyer

& Barton, 1998). For that reason alone, it is critical for learners to recognize and be able to define the terms found.

Content area vocabulary is specific to the concept; there is not much chance that readers will have encountered the words somewhere else, so terms should be explicitly taught. Because the new vocabulary can also be a new concept, the work should focus on the connections and not simply a definition of the term. Encouraging contextual definition and allowing the learners to identify the difficult words in a passage by skimming or scanning can be very effective.

Content Areas

The body of knowledge that makes up science includes: earth science, chemistry, physics, aero-space science, and biology. Students in elementary and secondary school systems have the opportunity to have thirteen years of study in the various aspects of this content area. Each of the four major areas has its own specific organizing structure. They share little in the way of vocabulary.

In the field loosely termed social studies, history and geography, civics, and government all come together. Again, students will have been exposed to years of classes in these fields of study. For GED preparation, the contrast between materials to cover, knowledge to impart, and time to accomplish this is immense.

While mathematics, reading, and writing are skills that can be organized and developed in a variety of ways, the content areas are a body of concepts and facts, which learners either know or do not know. This is the almost overwhelming challenge to the instructor: where to begin, what to emphasize, what to ignore. We know that on the GED science test, the life, physical, and earth and space sciences will all be tested. Questions will also encompass the National Science Education Standards, which connect the subject standards in strands which include: unifying concepts and processes, science as inquiry, science and technology, science in social and personal perspectives, and the history and nature of science (National Academy of Science, 1996.)

What makes it feasible for the instructor to cover this breadth of material is that the science questions typically draw upon daily experiences to illustrate scientific principles. In many cases, asking your learners, "Where in your lives have you encountered this type of situation?" is a good first step to take as you lead the class toward finding the correct answer.

Social studies puts itself within the context of daily life by



its use of visuals, particularly with advertisements and consumer issues. Topics covered in history and government are those any high school graduate would be expected to know. Many of the historical issues are those that resonate today, such as the treatment of the Indian nations in the 19th century. Again, building the awareness that today's news is tomorrow's history is a good first approach to the questions of the practice test.

The Content Area Template

The Content Area Template is a guide for the Inquiry Activities within the Learning Projects. The bulleted subsections are unique to the content areas.

The Learning Projects and Inquiry Activities in this guide are examples for inquiry-oriented instruction. Instructors should use their instincts for the teachable moment and their sense of their own class to develop further questions for Inquiry Activities or a different group of activities altogether. Your learners' different learning styles and the interests of your classes can be your best guide.

There are a variety of sources for materials beyond the test items in Practice Test A for the GED. You will be able to modify any of the materials you have been accustomed to using by using the Inquiry Template. Repetition plays an important role in the meta-cognitive process. Therefore, similar thinking/process questions are asked throughout the Learning Projects. It is through following the familiar process that learners begin to understand how they learn and to develop their own learning skills.

1) Identifying the Problem

In the first step of the process, learners are instructed to read the question in order to focus on what they are being asked to do. Particularly in test items where they are being asked to locate information, it is important to recognize the task at hand. In test items with long reading passages, learners are asked, as in any reading passage, to look over the passage to get a general understanding of the topic.

2) Becoming Familiar with the Problem

This step introduces several strategies important to reading in the content areas. The first is to preview the passage or the visual and the question. In dealing with

the vast material in the content areas, learners must focus clearly on the topic at hand; recognize it as being an American history question, or a biology question, and recognize that the material and its vocabulary are connected. The next strategy is to activate prior knowledge.

Working in content areas requires that learners bring up what they might know and what they have learned in specific content areas. New ideas cannot actually be learned and understood unless they are added to a body of knowledge. Adults, even those who have had little formal education, or whose experiences in the classroom have been unsuccessful, have learned a good deal about the content areas of science and social studies. It helps them to understand their own body of knowledge when they actively call it up.

The third strategy is for learners to identify the purpose of the questions. Learners should think about what they are looking for in a visual or a passage. They should also consider what about the topic interests them. As learners become better acquainted with the topics, their interests, prior knowledge, and understanding of purpose will assist them in developing an understanding of the concepts of these two content areas.

3. Planning, Assigning, and Performing Tasks

Planning

In the first phase of this step, learners decide whether they should work alone, in pairs, or in a group. Group learning, especially in these content areas, is particularly effective, for each member of the group can bring knowledge or awareness that the others do not have.

Assigning

If they are working in groups or pairs, the learners will have to decide upon who will take which roles in reading or in discussion, or identifying the important facts. As facilitator, you will be able to assess when your learners have reached the point that they should be simulating test-taking conditions by working alone.

Performing Tasks

As they are working on the task at hand, learners will use the following strategies:

- **Clarifying words.** Developing a working science and social studies vocabulary is paramount in building the body of knowledge and having an understanding of the concepts in both these fields. The vocabularies are distinct to the content areas; recognizing the words and



knowing what they mean is often enough to be able to answer the questions on the GED.

- **Building a context.** Learners must determine whether the passage or visual provides enough information for them to answer the question. This assists their building of the context of the field, so they can understand what is being asked of them and why it is important within their lives and also within the framework of the content area.
- **Analyzing the information.** Learners should look at the text or the questions to determine what they are being asked to do with the passage or visual or what kind of question they are being asked to answer. In this strategy the reader determines whether the answers can be found in the text, are not in the text, are the opposite of what is in the text, or not accurate.

Finally, **learners answer the question and defend their answers.** How they have dealt with the question is often more important to the learning process than what the answer is.

4. Sharing with Others

Telling other people what you know helps you to understand the material better. So take this opportunity not only to share the knowledge, but also to learn it more completely.

Learners see this statement every time they get to step 4, Sharing with Others. It may not at first be clear to your learners that the person who gets the most out of conveying information is the one who is conveying, not the one listening. The more learners communicate in pairs, small groups, or with the whole class, the more they will use thinking skills to get and convey information. One learns best when one teaches.

Sharing with others is an integral part of the Inquiry process. Communicating an understanding reinforces a learner's ability to make meaning. The groups discuss and then report to the class how they did the work, what strategies they used, and any questions they may have. The groups should be encouraged to lead class discussions, which further helps to build communication skills.

5. Reflecting, Extending, Evaluating

The three activities of this step are at the heart of the learning process. This step expands the test-taking process emphasized earlier in the template by using what was learned and applying it to new situations or test

questions. The visuals and topics in the passages on the Practice Test will not be repeated in the GED test; exploring how they learned and applying this to other topics will prepare learners to handle the test itself.

Reflecting: *Think about what you have learned.*

Thinking about what you have learned and experienced is part of the learning process. When the focus is only on the answer, you don't get much time to think about what was learned.

Reflection questions help the learners consciously examine their understanding. Reflecting questions tend to be analytical in Sternberg's *Successful Intelligence* model (2000). Here you can ask learners to reflect on:

- thinking skills learned
- strategies used
- test-taking skills developed

Other reflecting questions include:

- What did I need to know to be successful in getting this answer?
- Is there a different way to learn the concepts presented here?
- How will this Inquiry Activity help me pass the GED?

Extending: *Extend what you learned to new situations.*

In extending, you are being asked to transfer the information presented in the Practice Test question to other information or situations.

The learner has the opportunity here to build upon the knowledge presented by making connections. Understanding relationships, observing patterns, and recognizing differences are all important in constructing meaning, getting at a deeper understanding of the content learned, and transferring that learning to new situations. Most of the IAs have several extending activities. Instructors should feel free to choose among them taking into consideration their classes' interests and time constraints.

In the content areas, the extension activities offer an opportunity for learners to recognize certain science or social studies concepts and, then, to develop those concepts more fully by taking them into the skills areas – math, writing, and reading. The extending activities can be done in groups and reported to the larger group. The questions tend to be creative or practical in Sternberg's *Successful Intelligence* model (2000). Some examples of these questions might be:



- What strategy might someone use to understand this material?
- How might you use this in your home or at work?

Evaluating: *Assess what you learned and how you learned it.*

In this last step, you get a chance to review the content of what you learned and the methods used to learn. These questions have no right or wrong answers. This is your chance to look more closely at your learning style and the opportunity to state how you benefited or didn't benefit from the content and/or the methods presented in this IA.

The evaluation questions reinforce this highest thinking level in Bloom's Cognitive Taxonomy.

Evaluation questions tend to be analytical and practical in Sternberg's *Successful Intelligence* model (2000). Questions that could be asked include:

- What parts of the activity worked best for you? Explain.
- What parts did not work well for you? Explain.
- What thinking strategy will you use when taking the GED test? Why?
- How does following this 5-step format make you feel?

The Inquiry Activity template is dynamic and can be applied to different situations in multiple ways.

Student versions of all the Inquiry Activities can be downloaded from the *GED as Project* website:

<http://www.jmu.edu/gedproject>

Figure 1

The Science and Social Studies Template

- 1. Identifying the Problem**
- 2. Becoming Familiar with the Problem**
 - *Preview the passage*
 - *Activate prior knowledge*
 - *Identify the purpose*
- 3. Planning, Assigning, and Performing Tasks**
(Individually, in pairs, or in groups)
 - *Clarify words*
 - *Build a context*
 - *Analyze the information*
 - *Answer the question*
 - *Defend your answer*
- 4. Sharing with Others**
- 5. Reflecting, Extending, and Evaluating**

