

## Concept Paper

# **Design and Development of a National Health Literacy Skills Test**

**Council of Chief State School Officers (CCSSO)  
Health Education Assessment Project (HEAP)  
© 2011 CCSSO~HEAP**

Prepared by the Health Education Assessment Project (HEAP) SCASS National Health Literacy Skills Test Team – Nancy Hudson, John Olson, Sara Moshman, Kathleen Middleton, Tami Benham-Deal, Kathleen Allison

October 22, 2010

In this paper, it is proposed that a new National Health Literacy Skills (NHLS) Test be designed and developed for use in schools and districts across all states in the country. A brief summary of the issues, needs, purpose, and possible uses of the NHLS Test is presented in the following sections, and details of the proposed plans for the design and development of the test are specified. The goal of this concept paper is to describe the feasibility of creating such an instrument, how it would be possible, and the parameters for doing it. The following sections are included in the paper.

- Background and Statement of Need
- Purpose and Use
- Proposed Design on the NHLS Test
- Proposed Procedures in Development of the NHLS Test
- Additional Options
- HEAP SCASS Capacity
- Proposed Timeline and Budget

### **Background and Statement of Need**

*Nearly half of all American adults—90 million people—have difficulty understanding and acting upon health information.* According to the Institute of Medicine (IOM, 2004), the education system is one of three potential points of intervention for developing a health literate population. In many schools today there are current structures in place that can contribute to improved health literacy, either directly or indirectly.

The Health Education Assessment Project (HEAP), sponsored by the Council of Chief State School Officers (CCSSO), is a collaborative of states that have pooled human and financial resources to develop educational products and services to improve student health literacy (see capacity statement). The HEAP is in a key position to address the

education recommendations from the 2004 IOM report as well as the recommendation from the National Action Plan to Improve Health Literacy (2010) through the creation of a test of health literacy that can be used nationally in schools and districts across all states. A test that shows the effectiveness of teachers in making students more health literate would provide valuable information to many and would give health educators critical feedback on how well important health concepts were being learned.

The NHLS test would directly address how well health education is being delivered in schools. A useful working definition of the topic of health education from the World Health Organization (WHO) is that it *comprises consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health.*

The key area of focus for this paper is on health literacy. It has been defined by the **National Health Education Standards** (1995) and was accepted by the participants at the January 2009 Symposium “Health Literacy in the 21<sup>st</sup> Century: Setting An Educational Agenda” as: *Health literacy is the capacity of individuals to obtain, interpret, and understand basic health information and services and the competence to use such information and services in ways which enhance health.*

There is a strong need for good measurement tools that will address the areas of health education and health literacy, using the definitions from the WHO and the NHES as a base to build upon. Currently no instrument is available that provides data to assess the health literacy status of students across the country, and no recognized instrument exists that can provide data that informs how much teaching skills-based, standard-based health education improves student health literacy. We propose that a high-quality, valid and reliable health education measurement tool, i.e., a standardized NHLS test, be designed and developed that will provide useful quantitative data to assess the health literacy status of students.

## **Purpose and Use**

The possible purpose(s) of the NHLS test are as an instrument for research that determines status of health literacy in schools across the country, as an end of course exam in high schools, as a test for opt-out of health education courses, and/or as a summative assessment that will inform student outcomes. We see the main purpose of the NHLS test is to provide data that can draw conclusions about the level of knowledge and skills among adolescents leading to health literacy. This data would be the primary information that is reported from the test.

There are a number of possible uses for and users of the NHLS test, such as for

- State and district educators to use as end-of course exams, testing for opting out of health education courses, etc.

- Researchers to use the test data for conducting secondary research and various studies on the health literacy of students
- Educators to use as a measurement tool in health care settings for adolescents (with a possible adaptation to an adult audience)
- Summary data for use in analyses by various other audiences, such as insurance companies or health care providers/facilitators

For our immediate purposes, the focus will be on the first two areas above. Thus, in this paper we concentrate on the goal of developing a test of the health literacy of students as the priority use of the NHLS test. The other areas can be addressed later as the test is implemented and possibly expanded for other uses.

### **Proposed Design on the NHLS Test**

For the purpose of specifying an operational definition for an assessment of health literacy skills, it can be defined as the degree to which an individual (student) can apply the skills of accessing and analyzing valid sources of information (NHES #3), interpersonal communication (NHES #4), decision-making (#5), and self-management (NHES #7) to health concepts. These four “mega skills” will be assessed by the NHLS test.

The NHLS test will be designed to measure how well students are able to apply the mega skills from the NHES. In addition, health concepts from Health Education Standard 1 will also be measured. As stated by the NHES:

---

*Health Education Standard 1 -- Students will comprehend concepts related to health promotion and disease prevention to enhance health. The acquisition of basic health concepts and functional health knowledge provides a foundation for promoting health-enhancing behaviors among youth. This standard includes essential concepts that are based on established health behavior theories and models. Concepts that focus on both health promotion and risk reduction are included in the performance indicators.*

---

This standard is helpful in grounding the test with content specific scenarios by which students can answer questions related to the mega skills. Basically, students will need to know the functional knowledge on a specific health topic and use it to demonstrate levels of proficiency in the mega skills. Content questions on specific health topics will be included on the test along with the items to measure health literacy skills. Experts in the specific content areas will need to work with health educators in developing the functional knowledge questions on those topics.

In operationalizing the NHLS test, performance indicators can be useful in articulating specifically what students should *know or be able to do* in support of each standard. The performance indicators will serve as a blueprint for organizing the assessment. Initially, for the NHLS test, we are focusing on indicators at the high school

level (grades 9 – 12). The following performance indicators apply to the four mega skills from the NHES Standards that are the focus of the test:

Standard 3 – Accessing Information (AI). This standard focuses on how to identify and access valid health resources and to reject unproven sources. Application of the skills of analysis, comparison, and evaluation of health resources will empower students to achieve health literacy. For example,

- Students will be able to evaluate the validity of health information, products, and services.
- Students will know how to use resources from home, school, and community that provide valid health information.
- Students will be able to determine the accessibility of products and services that enhance health.
- Students will be able to determine when professional health services may be required.
- Students will know how to access valid and reliable health products and services.

Standard 4 – Interpersonal Communication (IC). This standard focuses on how responsible individuals use verbal and non-verbal skills to develop and maintain healthy personal relationships. The ability to organize and to convey information and feelings is the basis for strengthening interpersonal interactions and reducing or avoiding conflict. For example,

- Students will know how to use skills for communicating effectively with family, peers, and others to enhance health.
- Students will be able to demonstrate refusal, negotiation, and collaboration skills to enhance health and avoid or reduce health risks.
- Students will be able to demonstrate strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others.
- Students will be able to demonstrate how to ask for and offer assistance to enhance the health of self and others.

Standard 5 – Decision Making (DM). This standard includes the essential steps that are needed to make healthy decisions as prescribed in the performance indicators. When applied to health issues, the decision-making process enables individuals to collaborate with others to improve their quality of life. For example,

- Students will know how to examine barriers that can hinder healthy decision making.
- Students will know how to determine the value of applying a thoughtful decision-making process in health-related situations.
- Students will be able to justify when individual or collaborative decision making is appropriate.

- Students will be able to generate alternatives to health-related issues or problems and predict the potential short-term and long-term impact of each alternative on self and others.

Standard 7 – Self Management (SM). This standard promotes the acceptance of personal responsibility for health and encourages the practice of healthy behaviors. Many diseases and injuries can be prevented by reducing harmful and risk-taking behaviors. For example,

- Students will know how and be able to analyze the role of individual responsibility for enhancing health.
- Students will know how and be able to demonstrate a variety of healthy practices and behaviors that will maintain or improve the health of self and others.
- Students will know how and be able to demonstrate a variety of behaviors to avoid or reduce health risks to self and others.

These indicators are examples of the types of concepts and specific topics that can be measured by the NHLS test. Additional indicators and the types of items that can measure them will be developed as the project moves forward.

### **Proposed Procedures in the Development of a NHLS Test**

Based on several in-depth discussions among the NHLST Team to specify some key parameters for the design of the test, the following information is provided as a high-level plan and overview of our assumptions for the proposed test.

- The NHLS test will be designed for use at the high school level.
- Four “mega” skills of the NHES will be measured in this test -- AI (accessing and analyzing valid sources of information), IC (interpersonal communication), DM (decision-making), SM (self management).
- A minimum of 10 questions will be used to assess each mega skill so that reliable scores can be reported for each skill area. The HEAP skills cues will be used to guide the development of the items or select/adapt appropriate items already in the HEAP item bank.
- A variety of scenario-based prompts followed by a series of selected response questions will be used to elicit student skills.
- An additional sub-set of questions will be included in the test containing 10 items for a specific health topic area (such as injury prevention, nutrition, sex education, etc.) so that student knowledge in this health topic area can also be measured.
- In addition to reporting subscores for both the knowledge and skills measures as described above, a total health literacy score will be reported on student performance based on all 50 (or 60) items in the test. This score will be reported on a scale that is specially developed for the assessment.

- Performance levels will be developed for the test along with performance level descriptors that will describe student performance at the different levels (such as Basic, Proficient, Advanced).
- All items will be selected response (SR), i.e., multiple choice. However, depending on resources and plans, it may be possible to also include a few constructed response (CR) items in the test, such as one or two per knowledge or skill area.
- Items will be developed at all levels of difficulty (from easy to hard) and evenly distributed across the range of difficulties.
- The overall test will be designed to be, on average, of middle difficulty, (i.e. the overall difficulty level of the items will center around the median with approximately equal numbers of items at both the lower and higher ends of the scale's distribution). Item difficulties will be evenly distributed across the difficulty scale, with about half of them centered around the middle.
- Items and forms will meet industry standards for the development of quality tests, i.e., they will have acceptable difficulty, discrimination, and reliability, and they will not exhibit bias.
- Multiple forms of the test will be developed – at least two forms initially, and possibly four or more. A form can be designed to measure skills across are areas in health literacy or could be designed to focus on measuring just one of the health topic areas.
- The project will use teachers (health educators) recruited from HEAP SCASS states to do the item writing. They will be trained in item writing by assessment and content experts in the area of health literacy.
- The test will be delivered (administered) by computer as an online assessment. The project will develop the delivery system, which will be designed to be used in classrooms anywhere across the country.
- The existing HEAP web-based item bank and item development tool will be utilized during the development of the test. This tool provides the ability to review, edit, and refine items, as well as categorize, store, and retrieve them for use in the administration of the test.
- The test will be designed to be completed within one class period (approximately 50 minutes).

General Blueprint for NHLS Test

<b>Skill Area</b>	<b># of MC Items</b>	<b># of CR Items (optional)</b>
AI	10	1-2
IC	10	1-2
DM	10	1-2
SM	10	1-2
Health Topic Area (such as injury prevention, nutrition, sex education, etc.	10	1-2
TOTAL (per test form)	50	55-60
Total Items Needed for 2 forms	100	110-120

Total Items Needed for 4 forms

200

220-240

Note: Typically need to develop and field test twice the # of items as needed for the number of operational forms that will be assembled.

In general, the following activities will be conducted to develop the test. The NHLST Team will develop a variety of novel prototype items. A small pilot test of the items will be conducted in a select group of HEAP states to try out new concepts, evaluate the items, make adjustments, and refine the items. Major work on item writing will be done by health education teachers from states that are members of the HEAP SCASS project. This is a very cost-effective approach for developing assessment items and has been used successfully in many other testing programs. The items will be reviewed by a panel of state and national experts in the field. A larger field test will then be done to evaluate all items that will be used in the NHLST test. The items will undergo a thorough statistical analysis and review.

The following table summarizes the key steps (tasks and activities) in the process of developing a test and the parties responsible for conducting the work.

**Tasks and Activities**

**Responsibility**

1. Finalize test design. Specify test blueprint (based on NHES document). Create test/item specifications and requirements for test administration on computer.

NHLST Team

2. Develop a variety of prototype items. Conduct a small pilot test of the new items and the delivery system. This can be done in handpicked HEAP member states where it will be easier to get schools to try out the items.

Team with select HEAP SCASS states

3. Score the items (machine score SR items; if CR items are used, this will require a team of raters to score them). Analyze the pilot test data for item performance as well as for system functionality.

Team (with others trained as scorers)

4. Recruit teachers from states and train them on item writing. Develop a large pool of items covering all skill areas for a field test. As part of development process, conduct reviews for content, bias/sensitivity, and accessibility. In addition, evaluate the alignment of all newly developed items to framework/standards/blueprint for the test.

HEAP SCASS member states and test development vendor

5. Develop any ancillary materials that will be needed for testing, such as Administration Manuals or special prompts/documents.

Test development vendor

6. Conduct a larger-scale field test with a sample of approximately 1000 students taking each item. A

HEAP SCASS member states (with test

representative sample of states should be included in the field test.	administration vendor)
7. Score items and monitor scoring reliability. Analyze FT data using item response theory (IRT) and conduct differential item functioning (DIF) analysis for bias. In addition, reliability (internal consistency) and validity (content, construct, etc.) indices will be examined.	Test development vendor and/or technical advisor
8. Determine reporting format(s) for scores and subscores to be reported. Specify reporting scale for results. Conduct equating/pre-equating (if needed) and scaling. Specify performance levels for reporting. Conduct standard setting.	Team (with technical assistance from outside)
9. Select items to be used in operational test forms.	Team and vendor
10. Assemble operational forms for administration of online CBT. (Note: May need to prepare paper and pencil versions too for sites that are not able to administer the test online).	Test administration vendor

### **Additional Options for NHLS Test**

A number of additional approaches and options have been discussed by the NHLST Team that possibly could be included in the design, development, and implementation of the test. Following are some brief thoughts on them.

#### Use of Constructed Response Items and Performance Tasks

As noted previously, it may be desirable to include some constructed response items in the test. The advantage of including them is that they can elicit more of a response from students to measure their knowledge and skills. The disadvantage of CR items is that they will require scoring by trained raters, and this adds to the overall expense of the test. The Team recommends that the test be initially designed as an all-SR item test, and if resources allow, that a few CR items be included (1 or 2 per skill and content area). The same pros and cons apply to the use of performance tasks.

#### Automated Scoring of CR Items

At this time, the Team does not consider the use of automated scoring systems that utilize artificial intelligence engines to score CR items and performance tasks as feasible for the NHLS test. Although some large scale testing programs use AI scoring, it requires much programming work in advance and can initially be costly. We propose that this scoring approach be considered for possible integration in the test sometime in the future, once costs have come down to a reasonable level.

#### Computer Adaptive Test (CAT)

The use of a CAT can have some benefits. It can provide a more accurate measure of a student's skills and knowledge on a test since it zeroes in on their specific ability and level of performance. It may allow for shorter testing time. However, CATs require large item pools to function correctly and that items meet certain statistical properties. They also require special programming to design the adaptive delivery system. The use of a CAT for the NHLS test could be considered if the project's financial resources allow for the development and implementation of it. With the right funding and support, it could be beneficial to develop a CAT instead of a linear computer-based test.

#### Assessing Adults or Students at Other Grade Levels

As proposed in this concept paper, the initial focus on the NHLS test will be on the health literacy of high school students (grades 9 – 12). With additional funding, it would be possible to also measure the skills of other age groups, such as middle school students or adults. For example, some funders may be interested in getting national or regional data on the health literacy of adults that could be used to assess and monitor their skills in this area. If this is supported, then expanding the test to be used with a wider population range could easily be done. The design of the test would need to be adjusted slightly, additional items would need to be written that are appropriate for the age groups, and a representative sample of students and/or adults would need to be field tested.

#### **Proposed Timeline and Budget**

Typically, it takes at least two years to develop, field test, and operationalize a new testing program. However, it is possible to reduce the amount of time by using existing resources and materials. A good estimate of the total cost to develop and implement the new NHLS test depends on many key decisions that are made during the design process and the full scope of the work that is planned. A ballpark estimate for developing a new assessment program from scratch could range from about \$1 – 2 million or more, assuming a test development vendor is contracted to do the work, all items will be developed from scratch, a full field test is conducted, and at least two test forms are assembled. It is possible to reduce these costs by using some of the existing items from the HEAP item bank and using the web-based item development tool, having teachers and other personnel from states and schools provide key services, and utilizing existing online delivery systems. In addition to the start up costs, a budget for the ongoing administration of the NHLS test in future years could range from \$10 – 15 per student.