DOCUMENT RESUME

ED 216 902 SE 037 879

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TITLE Human Sciences KNOWING Module Data File, HSPKNOW. User's Guide for the Machine-Readable Data File.
INSTITUTION Biological Sciences Curriculum Study, Louisville, Colo. Center for Educational Research and Evaluation.
SPONS AGENCY National Science Foundation, Washington, D.C.
PUB DATE 31 Dec 81
GRANT SED-80-13571
NOTE 37p.; For related documents, see SE 037 878 and SE 037 880.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Curriculum Evaluation; Curriculum Research; *Databases; Elementary School Science; Elementary Secondary Education; Interdisciplinary Approach; Junior High School Students; Middle Schools; Program Evaluation; *Research Methodology; *Science Course Improvement Projects; *Science Curriculum; Science Education; *Secondary School Science
IDENTIFIERS *Human Sciences Program; National Science Foundation; *Science Education Research

ABSTRACT

The Biological Sciences Curriculum Study (BSCS) Human Sciences Project developed, produced, and field tested 13 interdisciplinary, non-traditional, non-text science curriculum modules for early adolescents, ages 11 to 14. A codebook (ED 211 382) contains the frequencies for the value of 23 variables for each of the 3,173 student-activity evaluation interactions (cases) for the activities in the KNOWING module, which was field tested (Spring 1977) with different schools and teachers than those participating in the field test of other modules. This user's guide documents the code book for the data tape KNOWACT, a tape containing 15 variables of student ratings of the 43 student activities in the KNOWING module. A list of variable names and labels with associated page numbers for the data file is provided. (Author/JN)

# Human Sciences KNOWING Module Data File, HSPKNOW

A file of the evaluation data obtained during the field test of the BSCS Human Sciences KNOWING Module between April and June, 1977. HSPKNOW contains 313 variables for 442 cases. This User's Guide also documents the code book for the data tape KNOWACT, a tape containing 15 variables of student ratings for each of the 43 student activities in the KNOWING Module.

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User's Guide for the Machine-Readable Data Files

Prepared with support from Grant No. SED 8013571, Research in Science Education (RISE) program, National Science Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the NSF.

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December 31, 1981

## ABSTRACT

The KNOWING Module was produced and field tested in the school year 1976 and '77. It was the last module in the BSCS Human Sciences Project, which developed, produced, and field tested fourteen interdisciplinary three year science curriculum modules designed especially for eleven to thirteen year olds. The field test of KNOWING followed by one year the three year field test of the other thirteen Human Sciences Modules. Twelve test sites were selected for testing KNOWING. These test sites were distributed geographically in different sections of the United States. Half of the test teachers had had previous experience with Human Sciences and half had had no previous experience with teaching these materials. Data for 446 students are contained in the data tape KSPKNOW. These students were eighth graders in twelve schools with fourteen teachers who had studied their regular science curriculum in the school year 1976 and '77. In April, 1977, they changed to the Human Sciences KNOWING Module and utilized this set of instructional materials from April until the termination of the school year in June, 1977.

The data file HSPKNOW contains 310 variables for the 446 student cases, comprising the field test data from the testing of KNOWING. The unique feature of student choice of activities as they studied this module makes the data file a valuable resource for studies of the varied curricula chosen by each student.

The second data file, KNOWACT, is described in this User's Guide. This file was developed from the activity evaluation forms completed by each student for each activity he or she chose. This file is cross-referenced with the data file HSPKNOW so that data about each student can be correlated using the two files. HSPKNOW contains both module specific and general data. The evaluation design was a prepost experimental group-only design. In addition to the pre- and post-test data, quizes, titled Problems to Solve, were administered to each student following the completion of each activity chosen. Responses to these activity specific tests are part of the tape record. In addition to the activity specific data, an attitude scale and a logic test were administered to a fifty percent random sample of the students. These data, plus date of birth, sex, school, teacher identifier, and ethnic group are included in the data tape. The data are stored on an SPSS systems file and may be obtained with or without SPSS labels. Additional materials regarding the field test of Human Sciences are also available.

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Codebook Contents, HSPKNOW

## History of the Originating Project

The KNOWING Module was the final module of the BSCS Human Sciences Program to be developed and field tested. The Human Sciences curriculum project, sponsored by the National Science Foundation, developed and field tested fourteen interdisciplinary science modules for use in classrooms for early adolescents. Thirteen of these modules were field tested with a single group of students in seven test schools between 1973 and 1976. The field test began with sixth graders in 1973, and concluded when these same students were eighth graders in 1976. A module, the basic instructional unit, consisted of a group of interrelated student activities. Each module was designed to last from six to nine weeks in a classroom. Level I modules, tested in grade six, were designed to last only six or seven weeks while Level II modules, tested in grade eight, were designed for a nine or ten week period. The complete history of the Human Sciences curriculum project is to be found in Ross (1981). A description of the test sites and other critical information about the field tests and data collected are provided in Robinson (1981a). Complete copies of the procedures and instruments used in the formative evaluation of the Human Sciences Program and specifically of the KNOWING Module are available in Robinson (1981b).

The KNOWING Module, containing 44 student activities, was tested in the spring of 1981 with a different group of eighth grade students from those testing the other Level II modules. The field test of KNOWING began in April, 1977, in 12 schools with 14 teachers and 19 classrooms. Seven of the test teachers had had experience with at least one of the previous years of Human Sciences field testing. Seven teachers were entirely new to the Human Sciences Program and had no specific orientation to the testing of the KNOWING Module by the Human Sciences staff. These seven teachers had received orientation or other information about the Human Sciences Program by attending institutes in various colleges or at meetings of national organizations.

The field test of KNOWING lasted for a period of ten to eleven weeks, depending upon school closure, but did conclude with the termination of school in June, 1977. Five hundred thirty-nine students were enrolled in the 19 field test classrooms. The KNOWING data file contains data on 442 cases from these test classes. The unique features of the Human Sciences classroom are important in understanding the data collected. The unit of material utilized by students was the activity. Each activity was a self-contained package of from one to eight or ten pages with data sheets where appropriate, materials, equipment, supplies, or other objects needed to do the study, and complete instructions for a student as to how, why, and what to investigate. No activities were assigned. Students had the option to choose the activities they wished to study. After selecting an activity, they were to gather the materials according to activity instructions and initiate their study. If there were seeds to plant or other operations that were followed by a delay of time, they were asked to choose another study and get it underway while waiting for development of plants or animals.

The activities in KNOWING were divided into two groups. Each group consisted of four clusters of activities. A cluster contained related activities around a specific problem, such as knowing the past. Group I and Group II activity clusters are presented in Table 1. In order to obtain a balanced use of the activities, one half of the test classes began the module with Group I activities available, but not Group II. The other half of the test classes had activities from Group II available, but not those of Group I.

TABLE 1
Group I and Group II Activity Clusters in KNOWING

| GROUP I | GROUP II |
|---|---|
| Know the Past (7 Activities) | Knowing About Man (3 Activities) |
| Heavens Above (4 Activities) | Notions of Motion (6 Activities) |
| The Human Body (6 Activities) | Whatever the Weather (5 Activities) |
| Materials and Shapes (4 Activities) | Knowing About People (8 Activities) |
| Integrative (all class) Ways of Knowing | |

The evaluation design was quasi-experimental, following Campbell and Stanley (1963), designated as a one group pre-posttest design. The treatment period lasted from about April 7, 1977, to the end of the school year, a period of from nine to eleven weeks in the selected test schools.

## Test Site Selection

Field test teachers and administrators from the three-year Human Sciences field test program were contacted by questionnaire to determine if they would be interested and able to test the KNOWING Module in the spring of 1977. In addition, college and university science and social science educators who had given workshops on Human Sciences were contacted to recommend teachers and schools who might be interested in testing the module. Questionnaires were sent to those schools and to the interested field test schools. Final site selection was made to include seven experienced Human Science teachers and seven teachers who had not had training from the BSCS staff. This criterion plus geographical distribution and kind of administrative unit were the major site selection criteria.

## Instrumentation

Two test instruments were designed to gather information prior to field testing and two to gather data at the termination of field testing. Two kinds of instruments were also used to gather data continuously throughout the module. These latter instruments were activity specific to reduce class time for testing. A fifty percent random sample of students was given one of the two instruments prior to field testing and the remaining students were given a second. A similar pattern was used at the termination of field testing of the module. The instruments used and the type of administration are shown in Table 2.

TABLE 2
Evaluation Instruments Used in the Formative Evaluation of KNOWING, a Level III Human Sciences Module

| Date | Instrument | Students |
|---|---|---|
| April 4, 1977 | Knowing Pretest, 44 items | 50 percent random sample, each class |
| | How Is Your Logic? Forms A & B, 13 items, each form | 50 percent random sample, each class |
| April 5 to end of school year | Problems to Solve, 1 to 5 problems per activity | Each student, specific problems for each activity studied |
| | Activity Evaluation Form 8 Likert scale items plus 3 essay problems | Each student, one form per each activity studied |
| Third week of May | Knowing Posttest, 44 items | 50 percent random sample, each class |
| | Science Questionnaire, rank order of classes 18 bipolar adjectives, Human Sciences 18 bipolar adjectives, Regular Science | 50 percent random sample, each class |

A 44 item KNOWING pre-test and posttest were designed to control for prior knowledge of key ideas developed in the KNOWING Module. The tests contained the same items, with the items or item groups reordered from one instrument to the other. Both instruments consisted of two sections: a 35 item set of statements to be marked either agree or disagree and a nine item multiple choice section with four choices per item. The agree or disagree section included three groups of items related to an expository section, and 14 unrelated items. Each of the multiple choice items was independent of the others.

How Is Your Logic? 1976 edition, was a 26 item two form (Form A and B) test of logical competence. This test had been used and

validated during the three-year Human Sciences field test. It was used to be able to compare the eighth grade group testing the KNOWING Module with the eighth graders at the end of three years of Human Sciences in terms of logical competence.

The Science Questionnaire was also used in the three-year field test of Human Sciences. This instrument was used to determine student attitudes, again to enable a comparison to be made with the three-year field test group (Robinson, 1980). This instrument contained two semantic differential scales, each with 18 bipolar adjective pairs. Conceptually, the adjective pairs were designed to measure four aspects of attitude: evaluation, value, activity, and judgment. The Science Questionnaire also had a section asking students to list and then to rank order all classes they were enrolled in during the year.

When students completed an activity they had chosen, they were to complete two forms. First, an Activity Evaluation Form, prepared on an optical scanning sheet for use with all activities in KNOWING was to be completed. The form asked for the activity title, time spent in and out of class on the activity, answers to eight Likert-type statements, and three open-ended essay problems.

A second activity specific instrument, "Problems to Solve," was a quiz of from one to four items developed specifically for the activity chosen. The items were a mixture of objectively-scored and essay problems. Scoring keys and suggestions for scoring were provided to the field test teachers for their use in evaluating student achievement.

## Codebook Variables

Eight variables are grouped as identification variables in the codebook. Each school was assigned a school number variable (SCHL). Teacher numbers and student numbers, sex of the student, age in months of the student as of April 1977, and the ethnic background of the student, were also coded and stored. Two school descriptors were used (SCHLORG), the school organization variable indicates whether the school was a middle school, grade six, seven, and eight, or a junior high school, grades seven, eight, and nine. The variable SCHLSITE indicates the demographic location of the school, urban, intercity, suburban, and rural. Identification variables begin on page 1 of the codebook and end on page 27. Year of birth (YOB), month of birth (MOB), and day of birth (DOB) are provided on page 28 and 29 of the codebook.

Values for the thirteen variables in the How Is Your Logic instrument are provided from pages 29 to 35 of the codebook. These items were scored using the scoring criteria developed by Gray (1981). Each item was scored according to the operational characteristic of the response of each student. These criteria were the same as those used for scoring How Is Your Logic? in the three-year field test of Human Sciences.

Student responses to the Problems to Solve instruments that were specific to each activity begin on page 42 and continue through page 109 of the codebook. These Problems to Solve are listed by variables that are the title of each of the 43 activities that were tested in the KNOWING Module. No data were gathered on the all-class activity, Ways of Knowing. Some of the essay questions had responses that were coded as more than one item. Variables such as FOSSIL3A and FOSSIL3B indicate that item 3 had responses coded into two variables. These scoring protocols could not be given completely, due to the limitations of the SPSS label system. As previously indicated, the complete presentation of every test item used in testing the KNOWING Module and the complete descriptions of all coding protocols are available in Robinson (1981). The number of valid cases for the items for each activity indicate the number of students who chose that activity and who also completed a Problems to Solve quiz form. Some value codes were not used for some items within this group of variables. Such omissions indicate that there was no coding protocol developed for that particular number. The value code seven, labeled blank, indicates that a student responded to at least one problem on the Problems to Solve sheet, but left the response to this particular item blank. Missing values indicate students who did not choose to do that particular activity. Valid cases indicate the number of students who chose the activity.

Students were asked to list each course they were taking during the spring semester, 1977, and then to rank order those courses by assigning one to the class they liked best, two to the next best, etc. Students were instructed that their ranking was comparative and did not indicate whether they liked any class or disliked any class but only to give the order of how they viewed their various classes on a comparative basis. The variable SCIRANK indicates the rank for the Human Sciences Module KNOWING. The value codes indicate ranking this variable first, second, third, etc., in comparison to other courses. Student rank orders of class preference begin on page 110 and terminate on page 121.

As with the items on How Is Your Logic?, all items obtained from the Science Questionnaire, including rank order, were obtained only for a fifty percent random sample of the students in test classes. Values for the semantic differential scale measuring the concept "How do you feel about Human Sciences?" begin with variable HS1, page 122, and terminate with variable HS18, page 130. The bipolar adjectives are listed as value one and value seven. Opposite value one is the bipolar adjective that was scored one, the lowest score given, and opposite value seven appears the adjective scored highest value, seven. The instrument itself had a midpoint of zero and values one, two, and three proceeding from left to right and right to left from the zero point. Values for the semantic differential title "How do you feel about regular science?" begin on page 131 and end on page 139. High and low scored items are shown in the same way as they were for the previous 18 bipolar adjectives. Values for the 44 items on the posttest begin on page 140 and terminate on page 155 of the codebook.

## Data Processing and Clean Up

Student responses from the KNOWING pre-test and posttest were obtained directly from student responses marked on the test booklets. Data from these two instruments and from the Science Questionnaire were coded by secretarial personnel onto optical scanning sheets and converted into cards. Student responses from "How is Your Logic?" were coded by Dr. William Gray directly from the student consumable test booklets. Data were provided to the project on a data tape in SPSS format.

Student responses to each Problem to Solve, the activity specific quiz, were coded by the principal investigator and converted into cards by secretarial personnel marking the code responses onto optical scanning sheets.

Each student case record consisted of seven data cards with data cards interfiled by student case. Cards were listed and checked for data errors by computing frequencies using the SPSS Frequencies program, "General" option. Outlying data were located and checked with original records to rectify inconsistencies. Of the 539 students enrolled in test classes during the ten to eleven week field test period, 442 cases were retained for the data file. Table 3 shows the total number of students who were reported by teachers to be enrolled in test classes at some time during the test period and the number dropped for reasons of insufficient data.

TABLE 3

Number of students by school and teacher in test classes in the KNOWING data file

| | | NUMBER OF STUDENTS | | | |
|---|---|---|---|---|---|
| SCHOOL | TEACHER | TOTAL | DATA FILE | DROP | PERCENT DROP |
| 14 | 01 | 53 | 45 | 8 | 15.1 |
| 14 | 06 | 60 | 56 | 4 | 6.7 |
| 16 | 04 | 31 | 23 | 8 | 25.8 |
| 17 | 07 | 33 | 9 | 24 | 72.7 |
| 19 | 02 | 27 | 24 | 3 | 11.1 |
| 21 | 03 | 23 | 19 | 4 | 17.4 |
| 22 | 05 | 63 | 48 | 15 | 23.8 |
| 23 | 08 | 48 | 47 | 1 | 2.1 |
| 23 | 09 | 31 | 13 | 18 | 58.1 |
| 24 | 10 | 25 | 25 | 0 | 0.0 |
| 25 | 11 | 37 | 33 | 4 | 10.8 |
| 26 | 12 | 25 | 20 | 5 | 20.0 |
| 27 | 13 | 26 | 26 | 0 | 0.0 |
| 28 | 14 | 57 | 54 | 3 | 5.3 |
| ALL | ALL | 539 | 442 | 97 | 18.0 |

The table shows that 18 percent of the students were dropped from the data file for reasons of too few data records. A student case was dropped if the student had data for only one or two of the five instruments used in the field test. Five teachers' test groups had deletions of 20 percent or more students. These data losses were probably due to lack of follow-through in administering instruments or in collecting or mailing instruments to the project office. Loss of cases in other classes was more likely due to student absence, turnover, or noncompletion of the particular instrument.

The KNOWING data file contains records for 442 students in 12 schools taught by 14 teachers. Data from two test teacher classes contain less than 50 percent of the students enrolled (see Table 3). Reliability estimates of each of the four major instruments used in the field test of KNOWING are shown in Table 4.

TABLE 4
Reliability estimates of four KNOWING Module instruments

| INSTRUMENT | NUMBER OF STUDENTS | NUMBER OF ITEMS | RELIABILITY |
|---|---|---|---|
| KNOWING Pretest | 280 | 44 | .67* |
| How is Your Logic? | 222 | 26 | .84** |
| KNOWING Posttest | 282 | 44 | .75* |
| Semantic Differential | | | |
| Human Sciences | | | |
| Evaluation | 268 | 5 | .84*** |
| Value | 268 | 5 | .80*** |
| Activity | 268 | 5 | .72*** |
| Interest | 268 | 3 | .84*** |
| Regular Science | | | |
| Evaluation | 268 | 5 | .91*** |
| Value | 268 | 5 | .87*** |
| Activity | 268 | 5 | .82*** |
| Interest | 268 | 3 | .88*** |

* Hoyt analysis of variance
** Cronbach's alpha
*** KR-20

## The KNOWING Module Activity Evaluation File KNOWACT

The Activity Evaluation Form previously mentioned was not presented in the previous discussion because it could not be included in the HSPKNOW Codebook without making the Codebook unwieldy. The Activity Evaluation File, KNOWACT, used the activity as the case rather than the student as the case. This was done to eliminate the large amount of unused tape space if the evaluation file had been included as a part of student cases in the HSPKNOW file. This file can be used in conjunction with the file HSPKNOW, as will be shown in the discussion below.

The Codebook Contents for KNOWACT appears at the end of this section. The structure of the file is repetitive, with 43 cases representing the 43 activities that were field tested in the KNOWING Module. It is repetitive in that each of the 43 cases contains the same variables. The first five variables within each activity case are identifying variables. Each activity is coded with an activity number that corresponds to the activity number assigned in the Problems to Solve section of the file HSPKNOW. Similarly, school number, teacher number, student number, and sex of student are repetitions of the identifying variables in the HSPKNOW file. Because these identification numbers are the same, the data from any particular student in the KNOWACT file can be interrelated with that student's data in the HSPKNOW file.

Following the identifying variables, which appear on pages 1 to 3 of the codebook, are two variables indicating the amount of time it took students to do the activity. These two variables are PERIODS and OUTCLASS. PERIODS indicates the number of class periods spent on the activity while OUTCLASS shows the number of hours spent on the activity outside of class. These two variables appear on page 4 of the codebook. The next eight variables in the codebook--enjoy, difficult, think, long, import, useful, knew, and recmnd--are responses to eight Likert-scale items. These variables begin on page 5.

Responses to the first essay item were coded into cognitive, attitudinal, and logistic responses. Attitudinal responses were those responses that indicated likes or dislikes. Cognitive responses were those that gave a content-specific reason in the response. Logistic responses were those that indicated what the student did, such as making something, interviewing someone, or conducting the activity. Responses to these three variables appear on page 9 and 10 of the codebook. The variable, LEARNED, gives the coded responses to a second essay problem, and the variable COMMENT gives coded responses to additional comments made by the student on the Activity Evaluation Form. The pages given in the discussion above refer to the pages for which the various variables appear for the first activity in the KNOWACT codebook, Strange Fossil. The Activity Evaluation Form was a generalized form to use for every activity the student chose. The variables, as described for Strange Fossil above, are repeated for each of the remaining 42 activities, beginning with Time Travel on page 11 and ending with the activity, The Storm, which begins on page 440, and terminating on page 450 of the codebook. The codebook contents for KNOWACT that follows gives precise pages for the variables for each of the 43 activities contained in this file.

Codebook Contents, KNOWACT

## References Cited


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Robinson, J. T. Student attitudes toward science courses in test schools using Human Sciences. Journal of Research in Science Teaching. 1980. 17(3): 231-241.

Robinson, J. T. Evaluation of the BSCS Human Sciences Program - Human Sciences Project. Louisville, Colorado: BSCS, 1981a.

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## Using the KNOWING Data Files, HSPKNOW and KNOWACT

The two data files, HSPKNOW and KNOWACT, provide cross-referenced data of the instruments used in the formative evaluation of the BSCS Human Sciences Module KNOWING. The data files for HSPKNOW were prepared by assembling the seven cards for each case (student), listing these cards to verify student numbers, and then to ascertain that every case was complete with either data or blank cards. Printouts were reviewed for the number of cards with data, and all cases that had only one or two cards with data were removed from the cases for further processing. Card listing and SPSS Frequencies computations were made to check the accuracy of each case and to determine any outliers for any variable that would be on the boundaries for that variable. Where anomalies were found, original papers for the student were used to make corrections or ascertain that the values were accurate as typed. When the data files were determined to be valid with every student record, the data file HSPKNOW was built.

The file KNOWACT was developed from data cards sorted by activity number. SPSS Frequencies were run on each variable within each activity number to identify outliers and to make corrections by consulting the original data where necessary. When the validity of each activity file was ascertained, the data tape was prepared. The resulting two data tapes make it possible for studies that relate student file data and/or logic and pre- and post-test data and/or attitude data to activity choice patterns, the ratings of activities by any student. Also ratings for each activity by students can be determined. Many other studies can be used in relating activity choice patterns or activity evaluation patterns to student characteristics.

## APPENDIX A
## Requests for Data File and Codebook Shipment

The Human Sciences KNOWING Module data file, HSPKNOW, and the file KNOWACT have three components, the data tape, the machine readable user's guide, and the codebook. Although the user's guide was termed machine readable and was so printed on the title, the determination was made not to include the user's guide as a machine readable volume since it could be obtained on microfiche at a very much reduced cost. The user's guides and the codebooks are available on microfiche or in hard copy. The codebooks are also available on tape. The data, stored as an SPSS systems file, is available on magnetic tape. Output can be written from two runs, one for card images and the second for SPSS labels. These tapes will be produced by a CDC Cyber computer. Users with CDC hardware may order an SPSS systems file tape if desired. A request form for ordering tape materials appears on the next page of this user's guide. Labels produced by CDC equipment cannot be used by other computers. To avoid problems in reading the tape, an unlabeled tape is recommended. Both the SPSS labels and the card images will be prepared in forms that can be read by any computing system. SPSS labels and data will be output using the SPSS 8.0 version. Tape titles are listed below. Use these titles on the Tape Order Form:

Human Sciences KNOWING Module Data File, HSPKNOW
Human Sciences KNOWING Module Activity Evaluation File, KNOWACT
Codebook for Human Sciences KNOWING Module Data File, HSPKNOW
Codebook for Human Sciences KNOWING Module Activity Evaluation File, KNOWACT

Requests for the user's guide and codebooks should specify whether print copy or microfiche is desired. Use the Nontape Order Form for these materials. Cost estimates will be sent prior to preparation and delivery. The publication Human Sciences Evaluation Materials discussed in the first section of this user's guide may also be ordered on the Nontape Order Form.

TAPE ORDER FORM

Name: _____

Address: _____

_____

_____

Title of Tape(s) Requested: _____

_____

_____

TAPE RECORDING SPECIFICATIONS
(Circle your specifications):

Seven-Track Tape

| | | | |
|---|---|---|---|
| Density | 200 | 556 | 800 |
| Parity | Even | Odd | |
| Record Blocking | Blocked | Unblocked | |
| Maximum block size | _____ | | |
| Record length | 80 columns | Other _____ | |
| CDC Standard Labels | Labeled | Not labeled | |
| 1-6 character label | _____ | | |
| Character code | ASCII | EBCDIC | Other_____ |

Nine-Track Tape

| | | | |
|---|---|---|---|
| Density | 800 | 1600 | 6250 |
| Parity | Odd | | |
| Record Blocking | Blocked | Unblocked | |
| Maximum block size | _____ | | |
| Record length | 80 columns | Other _____ | |
| CDC Standard Labels | Labeled | Not labeled | |
| 1-6 character label | _____ | | |
| Character code | ASCII | EBCDIC | Other_____ |

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MATERIALS REQUESTED

| No. Copies | Title | Form |
|---|---|---|
| _____ | Human Sciences KNOWING Module Data File, HSPKNOW, User's Guide for the Machine Readable Data File | ____Print<br>____Microfiche |
| _____ | Codebook for the Human Sciences Data File HSPKNOW | ____Print<br>____Microfiche |
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