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Assessing the Watson Research Process
Ed 229D Professor Daniel Schwartz
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Abstract:

Standards in history education are moving towards bringing history research and inquiry into the classroom. To address this shift, Watson an interactive online environment for history research was developed. Watson employs a model of history research based on the expert model of a historian. This paper describes an experimental study to assess the effectiveness of the Watson research process, including its process map and research instructions, in building a model of history research similar to that of a historian. A simple experimental design was utilized with students divided into a control and a treatment group. The treatment group was exposed the Watson research process and tool while the control group was not. Results indicated that the model of history research used by participants after exposure to the Watson tool was more similar to that of a historian than the model of research used by the control group. Additionally participants in the treatment group used steps in the process related to inquiry and investigation more often than those in the control group. Implications for further research and development of the Watson tool are discussed.

Introduction:

Current standards in history education state that for students to build true historical understanding they must, “engage in historical thinking: raise questions and marshal evidence in support of their answers, go beyond the facts in textbooks and examine the historical record for themselves. (National History Standards, 2000) This process of finding information, drawing conclusions, and reflecting on possible solutions, known as inquiry leads to a deeper understanding of history and makes it relevant to the lives of students. (Levstik & Barton, 1997) One method of using inquiry to study history is through the authentic practice of a historian - research. In fact, the National Assessment of Educational Progress reports that students who participate in the authentic activities of a historian and who are required to interpret and apply knowledge to the completion of projects, score much higher on the NAEP than students who reported that their lessons were limited mostly to reading and recalling the contents of textbook chapters. Despite these factors associated with higher performance, the majority of students report that they
use textbooks on a daily basis, and 23% of eighth graders had teachers who reported that they never or hardly ever used primary documents in their teaching. Students today are unfamiliar with the process of history research and are, “unable to communicate ideas about historical themes or cite evidence from primary or secondary sources to support their conclusions.” (NAEP1994)

In this context and in order to address the need to bring inquiry into the history classroom, curricula and technology tools have recently been developed. One example is Watson, an interactive web-based environment, which guides students through the history research process. (see figure 1) As one of its key features, Watson presents a six-step process to guide learners through doing history research. In Watson, this process is represented through 3 primary components: a visual map of the process displaying the six main steps (see figure 2), sub-step tabs (see figure 3) and instruction pages (see figure 4) for completing each research step. This research process, modeled after the authentic practice of historians, is designed to guide learners through researching while building a mental model of the research process. The design of this tool is based on the theory that by making the research process explicit and visible, through use over time learners will build a model similar to that presented by the tool.

This paper describes a research experiment designed to evaluate the effectiveness of Watson’s research process in building an “expert” mental model of historical research. The question to be answered in this study is: Does exposure to the expert process presented in the Watson tool aid students in forming a mental model of doing research more similar to that of a historian?

To address this question an experimental design was utilized. Learners were randomly assigned to either a treatment group or a control group. Learners in the treatment group were asked to complete a task designed to have them carefully review the Watson research process and then, without aid of the process, write a description of the process they would use to complete a history research project. The control group only received the second task, writing a description of the process they would use to complete a history
research project. Specifically, this experiment tests the assumption that after using the Watson tool learners will describe a research process more like that of a historian than those who did not use the tool.

**General Description of the Tool:**

Watson (an investigator’s helper) is an interactive web-based research environment designed to guide students through the process of historical research from topic selection to forming a thesis statement, collecting, analyzing and finally organizing evidence into a final outline for presentation. After students login to the Watson website, they are taken to the research environment interface (see figure 1) where they are able to begin the research process. Watson uses a six-step process based on an “expert” model of doing research. The steps in the Watson research process are:

- **Step 1:** Choose a Topic – students are aided in the process of selecting and narrowing a topic through the use of a database of topics and related subtopics in American history.

- **Step 2:** Form a Question – students are guided to form questions about their topic and encouraged to create questions they are curious about and would enjoy answering.

- **Step 3:** Create a Thesis Statement – A thesis statement is then formed based on what the student already knows about their topic. It is a tentative answer to their research question. Students are instructed that they will most likely need to revise their thesis statement as they research.

- **Step 4:** Collect Evidence – This step uses a search engine, which produces results in four categories of historical evidence. Students enter key words and receive search results in the categories of overview information, text documents, images, and audio/video. Evidence is then selected by the learner and saved to their file hierarchy. (see figure 5)

- **Step 5:** Analyze Evidence – Once evidence is collected learners are taken through a question and answer section designed to analyze the information. The questions guide students to think about bias and context in order to evaluate the information they have collected.
- **Step 6: Organize for Presentation** - The final stage in the process is where the student organizes evidence and data into an outline that can then be exported to a word doc, multimedia presentation or other mechanism to form their history narrative.

This research process is first introduced to the learner through a research process map visible in the first screen of the research environment (see figure 1) and then a part of every page thereafter. In the Watson research environment the process map makes the expert process model explicit and serves as not only a visual guide but as the navigation for the tool as well. The map creates a supporting structure for doing research, providing students with multiple entry points and control over the steps in the process.

Additionally, the Watson environment provides a space for students to work collaboratively as researchers and reflect on their own growth and learning through use of a research community forum (see figure 6) and a reflective journal (see figure 7).

Specifically with regard to this assessment the sections of the environment evaluated are the three main features that contribute to the research process: the process map, written instructions for completing each step and the sub-step tabs.

**General Description of the Experiment:**

In order to assess the Watson environment and its research process a between-subjects experimental design was utilized. Ten participants were randomly assigned to either a treatment group or a control group. Those in the treatment group were asked to complete a written worksheet comparing the Scientific Method to the Watson research process. This task was designed to have the five treatment group participants carefully review the Watson research process. The use of the Scientific method was a distracter task, a means to have participants carefully look at the Watson research process while believing their task was a comparison. After completing the comparison sheet, without aid of the process, the treatment group was directed to write a description of the process they would use to complete a history research project. The control group only received the second task, writing a description of the process they would use to complete a history research project.
project. The independent variable in this experiment was “process exposure”. While the
treatment group received exposure to the research process before completing the writing
task the control group did not. Therefore there were two conditions for this experiment,
the “process exposure” condition and the “no process exposure” condition. The
dependent variable in this experiment was the writing task where all ten participants write
a description of the process they would use to complete a history research process. These
variables were used to test for the effect of exposure to the Watson research process.
This experimental design was based on the assumption that without exposure participants
will relate their mental model of how to complete a history research project. Then, by
comparing this result to that of the treatment group we could look for the effect of brief
exposure to the research process on participants’ model of doing history research.

In order to evaluate the effect of exposure to the Watson research tool, the dependent
measure used in this experiment is a comprehension measure. In the comprehension
measure we asked participants to write out the steps they would follow to complete a
history research project. The consistency of this task between groups allowed for
comparison. From this authentic writing task we counted the number of steps recalled
verbatim and in “gist” of the 6 steps and 8 sub-steps in the Watson research process.
While the number of words used verbatim from the Watson research process was
recorded, the important measure for this study is the use of the steps in “gist”. The use of
the step in “gist”, within a comprehension task, reveals understanding and application of
the step to a research task.

Additionally it is important to note that we tested only the use of the 6 steps and 8 sub-
steps in the expert research process and not the order in which they were used. The
reason we did not measure the order of steps is that order is not of primary importance in
the research process. In fact, while experts have a similar and consistent model of doing
history research, the order in which they complete their research varies. To address this
variance in future iterations of the Watson research environment, different navigation
schemes will be explored in order to allow for a less linear process of research.
Possible outcomes:
There were a number of possible outcomes from this experiment. One possible result is that the treatment group used more steps from the Watson research process in their writing task than the control group. This outcome would support the theory that brief exposure to the expert research process impacts the mental model of doing research, at least for a brief period. However, if the data shows that the groups used the same number of steps in “gist” from the Watson process or the Control group used more steps than the treatment group the results would falsify the hypothesis. If both groups scored similarly in the experiment the result could be due to a number of factors. If both groups use few of the Watson research steps it would support the idea that the exposure task we designed did not supply enough exposure to build a model of research similar to that of the Watson process. For example, if both groups used a high number of steps from the Watson research process it could mean that our tool is unnecessary, due to the fact that all ten participants had an expert model of doing history research whether they reviewed the Watson research process or not.

Method:

Design:
A between-subjects experimental design was used in which ten participants were randomly assigned to either a control or a “treatment” group. The effect of exposure to the Watson historical research process was assessed, by comparing the performance of these two groups. Members of group 1, the control group, were assigned a history research topic and asked to write out the steps they would follow to complete their research. Members of group two, the “treatment” group, were asked to review the Watson research process by comparing it to the scientific method. After completing a comparison worksheet they were then assigned a history research topic and asked to write out the steps they would follow to complete their research.

Figure 8: Study Design

<table>
<thead>
<tr>
<th></th>
<th>Comparison Task</th>
<th>Writing Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Control Group</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
The writing task assigned to each group was a comprehension dependent measure. The consistency of this task between groups allowed for comparison. From the writing task the number of steps each group recalled verbatim and in “gist” of the 6 steps and 8 sub-steps in the Watson research process were counted. While we recorded the number of words used verbatim from the Watson research process, the important measure for this study is the use of the steps in “gist”. The use of the step in “gist”, within a comprehension task, reveals understanding and authentic use of the step in the participant’s model of doing history research.

**Participants:**
10 adults between the ages of 18 and 31 participated in the study. All participants were high school graduates. Possible participants who labeled themselves as history experts or had an undergraduate degree in history were excluded from the study. Assignment to each condition was done randomly with five participants assigned to each group.

**Materials:**
Materials used by the treatment group in the study included:

  
  The key components of the Watson research tool used in this experiment are the 6 step “expert” process map, 8 sub-steps and the written instructions for how to complete each step. The six step process (see figure 2) consists of choosing a topic, forming a question, creating a thesis statement, collecting evidence, analyzing evidence and organizing for presentation. In addition to these six steps Watson also details 8 sub-steps: picking a research question, answering the research question, collecting overview information, text information, images, audio/visual evidence, picking main points and creating an outline. Each step (main process map steps and sub-steps) includes brief written instructions on how to complete the step. (see figure 4) Use of the Watson research tool was vital to this experiment as participants in the treatment group had to be exposed to the tool in order to assess its impact on their model of doing history research.
o Scientific Method Description and process map (see materials 4): As a way to focus treatment group participants on the Watson research process they were given the distracter task of comparing this scientific method to the expert research process. Without this comparison task it would be too easy for treatment participants to anticipate the task and memorize the process. The handout includes the steps in the scientific method and a process map following these five steps. This scientific method was collected from the University of California, Berkeley biological sciences website. The method sheet details the steps in the scientific method: completing an observation, forming a hypothesis, making a prediction, running an experiment and forming a theory.

o Comparison Worksheet: (see materials 5) A worksheet designed to focus participants on the expert research process by comparing it to the scientific method was used with the treatment group. This worksheet first asked participants to record the steps in each process and then had participants compare six different aspects of the Watson research process to the scientific method.

Materials used by both the treatment and control group included:

o Writing Task Worksheet: (see materials 6) For the purpose of evaluating the use of Watson research steps in the treatment and control groups this writing task was given to participants. They were asked to read the instructions and complete the writing assignment. The assignment asked participants to imagine themselves as students in an undergraduate level American History survey course assigned a research project on the Civil War. They have been given no other guidelines for the research project. On the paper they are asked to write out the steps they would use to complete the project.

Procedure:

All participants participated in one testing session. The sessions took place in the course of one day, and lasted approximately 20 minutes for each participant in the control group and 40 minutes for the “treatment” group participants. All participants were tested
individually and completed permission forms and demographic data (see materials 1) before beginning the research experiment.

**Control Group:**
The control group was assigned a research topic, through a written scenario, and asked to write out the steps they would follow to complete their research. In addition they were asked to supply a brief rationale for each step. In order to complete the process, control group participants were told the following. This passage was also printed at the top of the handout given to participants:

> “You are student in an undergraduate level American History survey course assigned a research project on the topic of the Civil War. Think about the steps you would take to complete this project and record them on this handout in the space provided below.
> • Where would you begin?
> • What steps would you follow?
> • How would you conclude?

Additionally, while you are recording your method for tackling the problem, be sure to provide a simple rationale for each step. There are no incorrect answers.”

After completing this writing task the control group participants turned in their sheets, were thanked for their participation and released from the testing protocol.

**Treatment Group**
The treatment group followed a longer testing protocol. Their testing session began with the task of completing a worksheet comparing a scientific method process to the Watson historical research process. At the beginning of the session participants were told:

> “Your task in this research experiment is to compare the Watson history research process to the scientific method. Familiarize yourself with the Watson tool by briefly clicking through it. Using the tool and the handout
on the scientific method, complete the worksheet provided. When you finish you will be given a separate task, which will be introduced to you at that time.”

The exercise was meant to expose students to the Watson historical research process while believing they were comparing one process to another. After completing the comparison worksheet (see materials 5) participants were then assigned the same task as the control group (writing out their method for completing a research project) and followed an identical protocol.

Coding:
In order test for the dependent measure a coding method was designed. Data was coded by two individuals and results were compared for reliability. Verbatim and “gist” of the 6 steps and 8 sub-steps in the Watson research process were coded in each writing sample. In order to code the verbatim use of the Watson research process, the key term for each main step was identified. These key terms were: narrow, question, thesis, evidence, analysis, and organize. This was repeated for the sub-steps. If these terms were stated verbatim then the sample was labeled with the code for that word. For example if the word “narrow” was used in reference to narrowing a topic the paper would be coded with Nv (narrow verbatim). The following table (figure 9) illustrates the definition for verbatim for each of the 14 steps and the code used to label the passage within the writing sample:

Figure 9: coding scheme for verbatim use of research step

<table>
<thead>
<tr>
<th>Main Process</th>
<th>Key Word</th>
<th>Label</th>
<th>Sub-steps</th>
<th>Key Word/s</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 – Select Topic</td>
<td>Narrow</td>
<td>Nv</td>
<td>Pick Question</td>
<td>Pick question</td>
<td>PQv</td>
</tr>
<tr>
<td>Step 2 – Form Question</td>
<td>Question</td>
<td>Qv</td>
<td>Answer your question</td>
<td>Answer question</td>
<td>AQv</td>
</tr>
<tr>
<td>Step 3 – Create Thesis</td>
<td>Thesis</td>
<td>Tv</td>
<td>Collect overview info</td>
<td>Overview</td>
<td>OVv</td>
</tr>
<tr>
<td>Statement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 4 – Collect Evidence</td>
<td>Evidence</td>
<td>Ev</td>
<td>Collect text</td>
<td>Text</td>
<td>TXv</td>
</tr>
</tbody>
</table>
A similar method of coding was used to label passages that contained the “gist” of the Watson research step or sub-step. Gist in this case is defined as, the conceptual meaning of the step without verbatim wording. For example if the participant used the phrase, “The topic of the Civil War is too big – I would need to cut it down to a sub-topic.” This would be labeled Ng for “narrow gist”. Instead of containing the key word, for the gist, the writing must contain the key idea. The following table illustrates the definition for gist for each of the 14 steps and the code used to label the passage within the writing sample:

**Figure 10: coding scheme for “gist” use of research step**

<table>
<thead>
<tr>
<th>Main Process</th>
<th>Key Idea</th>
<th>Label</th>
<th>Sub-steps</th>
<th>Key Idea</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 – Select Topic</td>
<td>Narrow</td>
<td>Ng</td>
<td>Pick Question</td>
<td>Pick question</td>
<td>PQg</td>
</tr>
<tr>
<td>Step 2 – Form Question</td>
<td>Question</td>
<td>Qg</td>
<td>Answer your question</td>
<td>Answer question</td>
<td>AQg</td>
</tr>
<tr>
<td>Step 3 – Create Thesis Statement</td>
<td>Thesis</td>
<td>Tg</td>
<td>Collect overview info</td>
<td>Overview</td>
<td>OVg</td>
</tr>
<tr>
<td>Step 4 – Collect Evidence</td>
<td>Evidence</td>
<td>Eg</td>
<td>Collect text evidence</td>
<td>Text</td>
<td>TXg</td>
</tr>
<tr>
<td>Step 5 – Analyze Evidence</td>
<td>Analyze</td>
<td>Ag</td>
<td>Collect images</td>
<td>Images</td>
<td>Ig</td>
</tr>
<tr>
<td>Step 6 – Organize for presentation</td>
<td>Organize</td>
<td>Og</td>
<td>Collect audio or video</td>
<td>Audio or Video</td>
<td>AVg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pick main points</td>
<td>Main points</td>
<td>PMPg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Create an outline</td>
<td>Outline</td>
<td>OUTg</td>
</tr>
</tbody>
</table>
Additionally, in order to visually separate the verbatim results from the gist results, a circle was placed around verbatim labels and a rectangle was placed around gist labels. This aided the counting of the different measures. After coding each writing sample the number of verbatim and gist steps were counted and recorded.

**Results:**

The results from this experiment supported the hypothesis that exposure to the Watson research process will bring participants closer to an expert model of doing research. The treatment group used more steps from the Watson research process in their description of how they would do research than the control group. As expected the result was obvious in the verbatim use of steps (see graph 1), however more importantly, it held for the “gist” use of the steps as well. (see graph 2)

In the use of main steps the treatment group result was double that of the control group, with the treatment group averaging 5.4 out of 6 steps mentioned and the control group mentioning, on average 2.6 out of 6 steps. The result was less dramatic for the use of sub-steps, but the treatment group, on average, used more sub-steps in their description of their research process than the control group. Results for the main steps were consistent among individuals (see graphs 3 and 4). However for the sub-steps while the treatment group results were consistent among individuals the control group had one participant who scored much higher than the rest. (see graphs 5 and 6)

An interesting result became apparent when the results were charted by step, using the six steps in the main process. (see graph 7) The number of participants in both control and treatment groups were identical for steps one and four: narrowing the topic and collecting evidence and similar for step six: organizing for presentation. However, the result was dramatically different for steps two, three and five: forming a question, creating a thesis statement and analyzing evidence. In these steps while nearly all participants in the treatment group mentioned the steps, in the control group no-one mentioned step two and only one participant mentioned step three and step five.
Discussion:

Result 1: Treatment group participants described a research process more like that of a historian than those who did not use the tool.

The primary result from the experiment shows that the treatment group, after limited and directed exposure to the tool used a model of doing research similar to the expert process used in Watson while the control group did not. What this result indicates is that when transfer to the comprehension measure is done immediately after exposure to the tool, there is some effect of the tool on the participants model of doing research. What our results don’t tell us is how much of the effect is the tool and how much is the task that we assigned to the treatment group. It is possible that the comparison task itself was the key factor in building the expert model of research and not exposure to the Watson research process. Testing this result by using a different means to build familiarity with the process would help to evaluate this possible alternative explanation of the results.

Result 2: Findings were consistent across participants as a whole.

Consistency of results across participants was quite uniform, particularly for the main steps in the Watson research process. In the sub-step results overall consistency was again uniform with the exception of one participant. Upon examination of the demographic data (see raw data), it was found that this user, user 3C, had completed over 10 history research projects in her lifetime, double the number of any other participant. It is likely this factor impacted the number sub-steps she used and then raised the average for the control group as a whole. While the results were consistent across ten users this sample is quite small and the result could be based on the similarity of the participants as a whole as most were graduate students enrolled in an identical master’s program. Expanding the sample to include more participants and at different levels of education would help to verify the results of this experiment.
Result 3: There was variance in familiarity with the main steps, with the inquiry cycle steps (two, three and five) unknown to the control group but used by the treatment group.

One of the most interesting findings for discussion is the difference in which main steps the groups mentioned as part of their research process. While both groups recognized the need to narrow topics, collect information and organize the information for presentation, only the treatment group, as a whole, mentioned the steps in the inquiry cycle: forming a question, creating a hypothesis and analyzing information collected. More specifically, the control and treatment groups had equal numbers mentioning step one and four and nearly equal numbers mentioning step 6. However for the steps related to inquiry while four out of five participants in the treatment group mentioned forming a question, while no-one in the control group did. Additionally all five members of the treatment group mentioned forming a thesis statement and analyzing information, but only one member of the control group mentioned these steps. This result indicates that the steps related to inquiry are not present in the models of the control group but are present in the model used by the treatment group after exposure to the Watson research process. Again, expanding the testing group would help to verify this result.

**General Discussion:**

In this experiment the hypothesis that after using the Watson tool learners will describe a research process more like that of a historian than those who did not use the tool was tested. This was done in order to evaluate the effectiveness of the Watson research process in building an expert model of doing history research.

Based on the results obtained, we are cautiously optimistic about the research process used in the Watson tool. The process seems to contribute to the construction of a model of doing research similar to that of an expert. However, this experiment was limited by time, number of participants and development of the tool. A more authentic test of this research process, where participants actually use the tool to do research would be the best way to measure. By having history students use the tool to conduct research and then go
through research based on their model of the process without the tool, the process could be tested in more authentic manner.

Additionally, this experiment did not test the effect of time on the model created by participants through use of the tool. Testing use of the process over time and in varying projects would be another important step in verifying these results.

The results of this research experiment, while limited due to the length and breadth of the study, suggest that the Watson history research process and tool should be developed and tested further to address the issue of bringing inquiry into the history classroom.
References:


Appendix

Graphs:

Graph 1 - Average Number of "Expert" Process Steps Mentioned Verbatim by Group

Graph 2 - Average Number of "Expert" Process Steps Used by Group "Gist"
Graph 3 - Number of “Expert” Process Steps Mentioned (Gist) by User as Compared to Average

Graph 4 - Number of “Expert” Process Steps Mentioned (Gist) by User as Compared to Average
Graph 7 - Number of participants in each experiment group mentioning the "gist" of the expert research process main steps in their model of doing research (by step)

Treatment Group
Control Group

Main Steps in Expert Research Process
Step 2  Step 3  Step 4  Step 5  Step 6
Number of Participants mentioning "gist" of step
Figures

figure 1: Introduction to the Watson Research Environment

- History research is like investigating a mystery...you ask questions, collect evidence and create a story about what happened. Watson is here to help you be an investigator of history.
- Ready to begin? Follow the six steps in this research process to explore American History. Just click on "select a topic" to get started...

Figure 2: Process Map
Figure 3: Sub-step tabs example (top left of research environment)

Forming a question is next...

Your topic is The Civil War and your sub-topic is African-Americans in the Civil War.

Now you need to turn your topic into a research question. A question will help guide you in collecting and organizing the information available on African Americans in the Civil War.

To form a question ask yourself:

- What are you curious about?

Enter four questions you have about African Americans in the Civil War and then post them to your community for feedback.

Question 1: 

Question 2: 

Question 3: 

Question 4: 

Figure 4: Instructions Example

Create a thesis statement...

Your thesis statement is a one-sentence answer to your question—it is like a declaration of your belief. As you do research and learn more about your topic, your thesis statement will probably change. That’s OK, you will be able to edit it at any time.

- Review your journal reflection.
- Answer your question in a simple and specific thesis statement.
- As you collect and analyze evidence, you will discover things that may support or disagree with your thesis statement.
- Your thesis statement may transform from the beginning of your project to the end.
- Having trouble? Visit the research community and get help.

Question: Were African American soldiers treated with prejudice in the Civil War?

Thesis Statement: 

When you finish writing your thesis statement post it to the community for feedback.
Figure 5: Folder Hierarchy

Figure 6: Community Research Forum
Materials:

materials 1: Demographic Information

Demographic Information
Please complete the survey below.

Age:

Gender:  M  F

Highest level of education completed:
High school  Some College  Bachelor’s  Master’s  PhD

Undergraduate major:

How would you rate your level of general history knowledge?
Low  Moderate  High  Expert

How would you describe your understanding of doing history research?
Low  Moderate  High  Expert

How many history research projects have you completed?
0  1-5  5-10  Over 11
Materials 2: Introduction for the Control Group

Introduction for Group 1

Hello everyone! How are you all doing today? Well, first of all, we would like to thank you for spending a couple of hours of your day with us to help in our product study. My name is Joanne Kline/Laura Malcolm and I am a graduate student in the LDT program in Stanford’s School of Education.

⇒ Introduce Laura as another observer

Background to our Watson study as part of the master’s project for LDT:
This session is to assess a piece of our product, which will help us identify areas of possible improvement. Just to make it clear, you are not being tested here, this is solely for us to test the product. Both Laura and I are available to answer any general questions you may have regarding the product. All of the study results will be kept confidential and will be used for the sole purpose of our study report. Some housekeeping: It is customary in studies to have participants sign a waiver to allow us to use your responses as data in our report.

(sign permission slips here)

Please complete the demographic information on the reverse side of the permission slip before you begin.

For the purpose of this study imagine you are a student in an undergraduate American History survey course. You have been assigned a research project on the topic of the Civil War. Think about the steps you would take to complete this project and record them on the handout you have been given.

• Where would you begin?
• What steps would you follow?
• How would you conclude?

Additionally, after you record each step include the reason why you would take that step.

Does anyone have any questions before we get started?

When you complete the handout please give it to either Laura or myself. If you have any questions after completing the study, please feel free to contact us. Thank you.

Materials 3: Introduction for the Treatment Group

Introduction for Group 2

Hello everyone! How are you all doing today? Well, first of all, we would like to thank you for spending a couple of hours of your day with us to help in our product study. My name is Joanne Kline/Laura Malcolm and I am a graduate student in the LDT program in Stanford’s School of Education.

⇒ Introduce Laura as another observer

Background to our Watson study as part of the master’s project for LDT:
This session is to assess a piece of our master’s project, which will help us identify areas of possible improvement. Just to make it clear, you are not being tested here, this is solely for us to test the product. Both Laura and I are available to answer any general questions you may have regarding the product. All of the study results will be kept confidential and will be used for the sole purpose of our study report. Some housekeeping: It is customary in studies to have participants sign a waiver to allow us to use your responses as data in our report.

(sign permission slips here)

Please complete the demographic information on the reverse side of the permission slip before you begin.

Your task in this research experiment is to compare the Watson history research process to the scientific method. Familiarize yourself with the Watson tool and research process by briefly clicking through it. As you go through be aware that the process map is always at the bottom of the interface and the sub-steps for each step in the process are the tabs in the top left of the interface. Using the tool and the handout on the
scientific method, complete the worksheet provided. When you finish, you will be given a separate task, which will be introduced to you at that time.

A couple of words of caution about the product: this is a prototype and not completely functional. Please do not get frustrated. We are here to help you should any functionality be faulty. We have taken care to make sure all of your workstations are running well, however there is always a possibility that technology will fail us.

Does anyone have any questions before we get started?

Ok, enjoy the program. When you complete the worksheet please give it to either Laura or myself and we will introduce you to the second portion of the study. If you have any questions after completing the study, please feel free to contact us. Thank you.

Materials 4: Scientific Method sheet for comparison to Watson research method

The Scientific Method

The following steps make up the Scientific Method.

Step 1: Completing an Observation:
A good scientist is observant and notices things in the world around him/herself. (S)he sees, hears, or in some other way notices what’s going on in the world, becomes curious about what’s happening, and raises a question about it.

Step 2: Forming a Hypothesis:
This is a tentative answer to the question: an explanation for what was observed. The scientist tries to explain what caused what was observed. A hypothesis is not an observation, rather, a tentative explanation for the observation.

- Hypotheses reflect past experience with similar questions (“educated propositions” about cause).
- Multiple hypotheses should be proposed whenever possible. One should think of alternative causes that could explain the observation (the correct one may not even be one that was thought of!)
- Hypotheses should be testable by experimentation and deductive reasoning.
- Hypotheses can be proven wrong/incorrect, but can never be proven or confirmed with absolute certainty. Someone in the future with more knowledge may find a case where the hypothesis is not true.

Step 3: Making a Prediction:
Next, the experimenter uses deductive reasoning to test the hypothesis.

- Deductive reasoning flows from general to specific. From general premises, a scientist would extrapolate to specific results: if all organisms have cells and humans are organisms, then humans should have cells. This is a prediction about a specific case based on the general premises.
- Generally, in the scientific method, if a particular hypothesis/premise is true, then one should expect (prediction) a certain result. This involves the use of if-then logic.

Step 4: Running an Experiment:
Then, the scientist performs the experiment to see if the predicted results are obtained. If the expected results are obtained, that supports the hypothesis.

In science when testing/doing the experiment, it must be a controlled experiment. The scientist must contrast an “experimental group” with a “control group”. When doing an experiment, replication is important. Everything should be tried several times on several subjects.
Step 5: Forming a Theory: After repeating steps 3 and 4 until there are no discrepancies between theory and experiment and/or observation. When consistency is obtained the hypothesis becomes a theory and provides a coherent set of propositions, which explain a class of phenomena. A theory is then a framework within which observations are explained and predictions are made.

Research is cumulative and progressive. Scientists build on the work of previous researchers, and one important part of any good research is to first do a literature review to find out what previous research has already been done in the field.

Materials 5: Comparison Worksheet Watson Research Process to Scientific Method

Your task in this research experiment is to compare the Watson history research process to the scientific method. Familiarize yourself with the Watson tool by briefly clicking through it. Using the tool and the handout on the scientific method, complete the worksheet below.

<table>
<thead>
<tr>
<th>What are the steps in the Watson historical research process?</th>
<th>What are the steps in the scientific method?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please complete the questions below:

1. Compare and contrast the first step in the Watson research process to the first step in the scientific method. What is similar and what is different?

2. How do you form a history research question using the Watson tool? How do you form it using the scientific method? Are there common ideas involved?

3. What are the detailed steps in creating a thesis statement? Is creating a thesis statement more similar to creating a hypothesis or making a prediction?

4. Is there a step in the scientific method that is similar to “collecting evidence”? If so, which step and how is it similar?
5. Do you think collecting and analyzing evidence in history research is comparable to experimentation in the scientific process? Why or why not?

6. What steps within “organizing for presentation” relate to forming a theory?

Materials 6: Worksheet for the Comprehension Task – Both Groups
You are a student in an undergraduate level American History survey course assigned a research project on the topic of the Civil War. Think about the steps you would take to complete this project and record them on this handout in the space provided below.
- Where would you begin?
- What steps would you follow?
- How would you conclude?

Additionally, while you are recording your method for tackling the problem, be sure to provide a simple rationale for each step.

There are no incorrect answers.

Materials 7: Permissions

Masters Project Assessment Study
Student Participant Consent Form

May 30, 2001

Dear Participants,

We are master’s candidates in the Learning, Design and Technology program at Stanford University interested in innovative teaching practices and the role of technology in teaching and learning. As part of our program, we are asked to research, build, test and assess a piece of educational technology. For our design project we developed Watson: an online tool for historical research. Currently, we are assessing our tool. This study is for that assessment purpose.

The records we maintain from these sessions will be kept strictly confidential — they will not identify you by name. The written records we collect are for careful and confidential analysis of learning and teaching...
interactions, and are used only for research and research presentation purposes. These findings may be shown in other forums (e.g., promotional materials). Your identity will be kept strictly confidential in all publications resulting from this research. Participation is voluntary and you may withdraw at any time from the research study. If you have any questions about this project, we can be contacted at the e-mail addresses below.

Sincerely

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Laura Malcolm
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Master’s Project
Student Participant Consent Form

Please check one response and return this completed form:

I □ agree  □ do not agree to participate in the research study outlined above.

Signature of participant: __________________________________________

Printed name of participant: _______________________________________

Date: ____________