**Sleep Deprived?**

**Subject area/course**: Social Sciences, Introduction to Statistics

**Grade level/band**: 11–12

**INSTRUCTOR PROCEDURES**

1. **Task overview**:

This task is an opportunity for students to apply their statistical reasoning to a relevant social and health issue: the importance of sleep. This task focuses on the use of the normal distribution as a mathematical model and on formulating a question, gathering data, and answering a key question. After researching the topic in general, students will gather a data set (*n* > 30) on the topic of sleep habits from their peers. In a summary report, students will demonstrate their ability to communicate this important topic using the language of probability and statistics.

1. **Prior knowledge required:**

Students should be able to:

* + Create a histogram and normal probability plot using statistical software.
  + Use a style guide to cite resources.
  + Identify reliable Internet resources.

1. **Common Core State Standards aligned to this task**:

[CCSS.ELA-Literacy.RST.11-12.2](http://www.corestandards.org/ELA-Literacy/RST/11-12/2/) Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

[CCSS.ELA-Literacy.RST.11-12.7](http://www.corestandards.org/ELA-Literacy/RST/11-12/7/) Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

[CCSS.ELA-Literacy.RST.11-12.8](http://www.corestandards.org/ELA-Literacy/RST/11-12/8/) Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

[CCSS.ELA-Literacy.RST.11-12.9](http://www.corestandards.org/ELA-Literacy/RST/11-12/9/) Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

[CCSS.MATH.CONTENT.HSS.MD.A.4](http://www.corestandards.org/Math/Content/HSS/MD/A/4/) (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

[CCSS.MATH.CONTENT.HSS.IC.B.4](http://www.corestandards.org/Math/Content/HSS/IC/B/4/) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

[CCSS.MATH.CONTENT.HSS.IC.B.6](http://www.corestandards.org/Math/Content/HSS/IC/B/6/) Evaluate reports based on data.

[CCSS.MATH.PRACTICE.MP3](http://www.corestandards.org/Math/Practice/MP3/) Construct viable arguments and critique the reasoning of others.

[CCSS.MATH.PRACTICE.MP5](http://www.corestandards.org/Math/Practice/MP5/) Use appropriate tools strategically.

1. **Time requirements:**

Plan about one week for students to complete the task. Schedule in-class time to introduce the project and to answer initial questions. Allocating time in the next class session to check and discuss their initial graphs and analysis is helpful to facilitate student success.

1. **Instructor materials to use during administration:**
   * Students will need access to computers and the Internet for research
   * Students should use statistical technology to generate the histogram and the normal probability plot
   * A point of departure for information on sleep heath are the web sites:
     + - <http://sleepfoundation.org/sleep-topics/teens-and-sleep>
       - <http://healthysleep.med.harvard.edu>
2. **Instructor procedures during administration:**
   * Plan a kick-off to the project that includes a multimedia element related to sleep deprivation. A short video clip that either touts the benefits of sleep or shows the dangers of sleep deprivation will serve to pique students’ interest.
   * Asks students to explain possible methods for data collection and what type of bias certain

methods would introduce to their research study. How can they minimize these sources of bias?

* + Students should work independently on this project, but small (2–3 students) groups can be used at the teacher’s discretion for class discussions.
  + To facilitate student success, it is prudent to schedule class time to review their progress, particularly if this is their first project activity.
  + While a written report is required, oral presentation (to include poster presentation) of their project is good practice.

1. **Student support:**

The following suggestions are examples of scaffolding that can be used to meet the diverse student needs within the classroom.

* Provide class time for research on students’ topics.
* For the final product, all learners will benefit from peer assistance while brainstorming their topics, as well as a peer or teacher review of their papers before final submission.
* Some students will have good research skills, but some will need guidance in the determination of appropriate sources and where to look for them. It is important to spend class time in review of what constitutes an appropriate source in advance of students’ independent work time.

1. **Extensions or variations:**
   * Since the students are asked to find literature on the topic of sleep, they may form an additional hypothesis related to sleep. (For example: the more hours one spends on extracurricular activities, the less time one has for sleep.) Students could pursue these types of questions through explorations of bivariate data.
   * Students could present the results of their research to the class via an oral or multi-media presentation.
   * If there is a particularly interesting research question, a panel could be organized where students share ideas and suggest further avenues of research.
2. **Scoring and assessment considerations:**

EPIC developed the *College and Career Ready (CCR) Task Bank Scoring Rubric* *for Scientific Research Plans and Reports* to accompany this task. If your school or department uses a standardized rubric that would fit the content and requirements of this task, you may choose to use your existing rubric. The following notes and suggestions are meant to clarify the intent of the rubric and include considerations for the assessment of student work.

* When assigning the task, provide students with the rubric that will be used to score their final product and discuss it as a class.
* Unlike some rubrics, the *CCR Task Bank Rubric* does not predetermine “point values” for the scoring criteria. The rubric thus allows for flexibility with different instructors’ scoring systems and individual determination of the “weight” of each criterion.
* Student work that scores at the *Accomplished* level is considered to be entry-level college work.
* The *Exceeds* category on the rubric provides an example of how a student can go above and beyond the *Accomplished* level. These examples are intended to be only ONE way a work product can exceed expectations, thus allowing room for your professional judgment.
* If needed, consider including task-specific criteria as an additional scoring category to the rubric or providing a checklist of requirements for the task.