Students read a wide selection of texts to select information for a choice of writing tasks, take notes, document, summarize, analyze discourse features that indicate attitudes, and engage in critical thinking. They represent the results of an informal survey and conduct/write up a more formal one, or they write a brochure or a proposal.
### Outcomes

**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 1.7** Evaluate a given text...

**SLO 4.1** Use language to encourage...

**SLO 6.2.7** Use elaboration...

**SLO 6.2.12** Use inferencing to guess the meanings...

**SLO 6.3.2** Use co-operation...

**SLO 1.5** Examine and interpret various visual media...

**SLO 5.4** Show understanding of the effect of cultural background...

**SLO 6.2.7** Use elaboration...

**SLO 6.2.12** Use inferencing to guess the meanings...

---

### Instructional and Learning Sequence

#### Sequence 1

**Activation**

Distribute sleep quotations. Assign a different quotation to each pair of students, to read and explain to the group the ideas or feelings about sleep expressed in the quotation.

**Discussion**

Ask students: What is the purpose of sleep?

There is no need for them to be scientific in their responses.

<table>
<thead>
<tr>
<th>Language Features</th>
<th>Discourse Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>form of proverb</td>
</tr>
<tr>
<td></td>
<td>figurative language</td>
</tr>
</tbody>
</table>

**Academic Language Functions**

- explaining
- interpreting

- a) View the cartoon of sleepy school children. Describe the action in each frame.
- b) Discuss: Why are children often tired at school?
- c) Survey the class: What time did students go to bed last night? How many feel tired? Why? Do they feel they get enough sleep?

<table>
<thead>
<tr>
<th>Language Features</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>school board, zzz (representing sleep)</td>
</tr>
</tbody>
</table>

**Academic Language Functions**

- describing a sequence
- inferring
- discussing
Student Learning Tasks

With a partner, read and explain to the group the ideas or feelings about sleep expressed in the quotation from Handout 4-6. (E)
Discuss the purpose of sleep. (C)

Teacher Notes and References

Handout 4-6: “Sleep Quotations”

a) View and describe Handout 4-7: “School Start Times.”
b) Discuss the question: Why are children often tired at school? (C)
c) Answer the survey questions. (C)

Handout 4-7: “School Start Times” cartoon

This cartoon alludes to the discussions in North America about school start times. Some people feel that students would do better if they started later.
**Outcomes**

**Instructional and Learning Sequence**

**Survey of Sleep Hours**

Students can record their own hours of sleep for the previous night or over several nights. Compile these into one class chart. Survey students who sleep less than seven hours for the reasons. Analyze the reasons and make a graphical representation (bar, pie, other) of the results.

**Optional Writing Task**

Students write a paragraph that interprets the information on the graph.

---

**Language Features**

<table>
<thead>
<tr>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>compile</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Discourse Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>discourse markers for cause and effect, comparison</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Language Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>expressing cause and effect</td>
</tr>
<tr>
<td>synthesizing</td>
</tr>
<tr>
<td>interpreting data</td>
</tr>
<tr>
<td>Student Learning Tasks</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Record your hours of sleep for the previous night or several-night period. (I)</td>
</tr>
<tr>
<td>Write a paragraph that interprets the information on the graph. (I)</td>
</tr>
</tbody>
</table>
### Outcomes

| SLO 2.3.1 | Use the structures and language features… |
| SLO 2.3.2 | Demonstrate increasing awareness of… rhetorical forms… |
| SLO 3.1   | Seek, organize, and synthesize information… |
| SLO 3.2   | Develop and implement a plan for researching… |
| SLO 3.3   | Quote from or refer to sources… |
| SLO 6.1.1 | Use advanced organization… |
| SLO 6.1.2 | Use organizational planning… |
| SLO 6.1.7 | Use problem identification… |
| SLO 6.2.1 | Use resourcing to access… |
| SLO 6.2.8 | Use imagery in the form of mental or actual pictures… |
| SLO 6.2.9 | Use summarization… |
| SLO 6.2.11| Use transfer… |

### Instructional and Learning Sequence

#### Writing Tasks

Introduce the main writing tasks. Students choose one option to be completed for the end of the topic:

a) Students plan a survey based on the different effects of sleep deprivation as described in the readings. Remind them to maintain the privacy of their subjects. Display the data graphically, and write a short summary of the findings, using appropriate reporting verbs. Include a paragraph interpreting the findings, using modals and other hedging language.

b) Students develop a brochure or a web page that offers information to other teenagers about the importance of sleep and tips for getting adequate sleep as a student. Information should be displayed using lists, short paragraphs, clear language, and illustrations.

c) Students use the information from the readings and the initial survey of student sleep hours to write a proposal to the school authorities to modify the school day to improve student sleep habits. Include citations from readings.

### Language Features

<table>
<thead>
<tr>
<th>Vocabulary</th>
<th>sleep deprivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures</td>
<td>modals, reporting verbs</td>
</tr>
<tr>
<td>Discourse Features</td>
<td>hedging markers</td>
</tr>
<tr>
<td>Academic Language Functions</td>
<td>interpreting data explaining</td>
</tr>
<tr>
<td></td>
<td>synthesizing summarizing</td>
</tr>
</tbody>
</table>
Student Learning Tasks

**Assignment**

Choose one option:

- a) Plan a survey based on the different effects of sleep deprivation as described in the readings. (I)

- b) Develop a brochure or a web page that offers information to other teenagers about the importance of sleep and tips for getting adequate sleep. (I)

- c) Write a proposal to the school authorities to modify the school day to improve student sleep habits. (I)

Teacher Notes and References

When a news magazine discusses a major story, it often reports on a range of research findings. Each research study focuses on a specific investigation. The magazine then makes the connections that are relevant to the general public. Student writers must do the same thing, connecting information and viewpoints from several places to produce something of their own. In order to complete the tasks, students will need to gather information from several sources. Discuss the process of surveying general information about the topic, reading several sources, and choosing relevant information for the specific task.
Outcomes

SLO 1.1 Engage with increasingly difficult oral and/or visual texts...
SLO 1.2 Respond to texts with increasing independence...
SLO 1.4 Show an awareness of organizational patterns...
SLO 1.6 Interpret a range of texts...
SLO 6.1.1 Use advanced organization...
SLO 6.1.5 Use selective attention...
SLO 6.2.4 Use note taking...

Instructional and Learning Sequence

Sequence 2

A series of readings follow in this sequence. Teachers may elect to use all or some of the readings. Pre-reading and post-reading questions are provided to assist students in comprehending and analyzing the reading.

Distribute the article “What Happens When We Sleep?”

Pre-reading Questions

1. What kind of article is this? (general introduction)
2. Preview the article’s organizing features and choose an efficient method for taking notes.
3. Given the task you have chosen, what kind of information will this article likely provide?

Post-reading Questions

1. How do scientists track the stages of sleep?
2. What happens during the stages of deepest sleep?
3. Define REM sleep. When does it occur?
4. According to the restorative theory and the adaptive theory, why is REM sleep important for young people?
5. What is the scientific term for biological “clock”?
6. What happens when a person’s biological clock and society’s clock “get out of sync”?

Language Features

Vocabulary
REM, deprived, reinforce, adept, circadian rhythm, correspond to, core body temperature, alert, conversely, irresistible, “out of sync,” ensue

Distribute Handout 4-8: “Types of Sleep”

Pre-reading Questions

1. What different kinds of sleep are you aware of?
2. What do you think is the purpose of dreaming?
3. Do sleep patterns change as we get older?

Post-Reading

Construct a chart to compare the two kinds of sleep described in the reading. (See the sample chart.)

<table>
<thead>
<tr>
<th>Types of Sleep Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Electrical activity</td>
</tr>
<tr>
<td>What happens</td>
</tr>
<tr>
<td>How it changes with age</td>
</tr>
</tbody>
</table>
Consider the pre-reading questions.
Preview the article’s organizing features and choose an efficient method for taking notes. (I)
Read the article and take notes.
Respond to the comprehension questions drawing on the notes.

Consider the pre-reading questions (I)

Read the article on Handout 4-8: “Types of Sleep.” (I)
Construct a chart to compare the two kinds of sleep described in the reading. (I)

**Internet Resource:** “What Happens When We Sleep?”
(reading level: medium, 9.1, Flesch-Kincaid readability level) at: <www.health.discovery.com/centers/sleepdreams/basics/> or another article that gives an introduction to sleep cycles and the theories of why we sleep.

**Handout 4-8:** “Types of Sleep”
(reading level: easy, 8.2, Flesch-Kincaid readability level)
**Outcomes**

**SLO 1.1** Engage with increasingly difficult oral and/or visual texts...

**SLO 1.2** Respond to texts with increasing independence...

**SLO 1.4** Show an awareness of organizational patterns...

**SLO 6.1.1** Use advanced organization...

**SLO 6.1.5** Use selective attention...

**SLO 6.2.7** Use elaboration...

**SLO 6.2.9** Use summarization...

**Instructional and Learning Sequence**

**Pre-reading Questions**

a) Note opening sentence:
   It’s 7:45 a.m. Don’t expect a cheery “good morning” from Kami Obradovic. “I don’t know my own name,” said the 16-year-old student. “I’m not really coherent.”

b) Predict the contents and the main idea of the article.

c) Scan the article to learn more about the effect of sleep loss on teenagers. Try to answer all of the comprehension questions in 10 minutes.

**Comprehension Questions**

d) Look for reporting verbs. In one phrase or sentence, summarize the contents of this passage (effects of poor sleep on learning in adolescents). What advice do the experts give? Do you agree with the advice?

e) Take notes on information that is relevant to the writing task.

**Language Features**

**Vocabulary**
- brag, burden, deprivation, lifestyle, optimum, sighs, stint, sufferers, symptoms
- **From AWL**: attitude, coherent, criteria, depression, grade, institutions, insufficient, issue, job, link, medical, research, revealed, team, volunteer
- **Reporting verbs**: have concluded, found, has determined, shows, says, builds on, suggests, may be linked

**Discourse Features**
- reporting verbs

**Academic Language Functions**
- describing/explaining
- expressing cause and effect
- evaluating
- predicting
- summarizing
Student Learning Tasks

a) Consider the three pre-reading questions. (I)
   1. How many hours do you think a young child requires? An adult? A teenager?
   2. What are the results of not getting enough sleep?
   3. How serious a problem for young people is lack of sleep?

b) Predict the contents and the main idea of the article.

c) Scan the article to learn more about the effect of sleep loss on teenagers. Try to answer all of the comprehension questions in 10 minutes.

d) Scan the article to find the answers to five comprehension questions. (I)
   1. How much sleep should teenagers be getting at night?
   2. What is the risk that many teenagers don’t know about?
   3. What are three reasons for insufficient sleep in teenagers?
   4. Why do older teens miss sleep?
   5. What does the researcher mean when she says, “Less sleep does not always mean more time”?

e) Take notes on information that is relevant to the writing task.

In one phrase or sentence, summarize the contents of this passage (effects of poor sleep on learning in adolescents). (I)

Teacher Notes and References

Internet Resource: “Sleep-Deprived Teens Run Risk of Depression” at:
<www.canoe.ca/LifewiseFamilyHomework01/0305_sleep_cp.html>
**Outcomes**

| SLO 1.6 | Interpret a range of texts... |
| SLO 6.1.5 | Use selective attention... |
| SLO 6.2.4 | Use note taking... |

---

**Instructional and Learning Sequence**

Distribute **Handout 4-9**: “The Consequences of Insufficient Sleep for Adolescents.”

Scan the title and first paragraph. Predict the contents and the main idea of the article.

**Pre-reading Questions**

1. What is the purpose of the section beginning: “In this article I provide an overview”?

2. What will the remainder of the article do?

Scan the rest of the excerpt. Take notes.

---

**Language Features**

**Vocabulary**

From AWL: choose a few of these words to focus on:
- abstract, area, aspects, brief, complex, conflicts, consequence, contribute, cycle, data, defined, depressed, diminished, documenting, domains, empirical, enormous, evaluation, evidence, factors, identify, impact, incompatible

**Discourse Features**

- transition markers
- overview

**Academic Language Functions**

- expressing purpose
- showing connection
### Student Learning Tasks

Scan the title and first paragraph on **Handout 4-9**: “The Consequences of Insufficient Sleep for Adolescents.” Predict the contents and the main idea of the article. (I)

Consider the pre-reading questions. Scan the rest of **Handout 4-9**: “The Consequences of Insufficient Sleep for Adolescents” and take notes. (I)

### Teacher Notes and References

**Handout 4-9**: “The Consequences of Insufficient Sleep for Adolescents” (difficult—Grade 12)

- Note the intended audience and reading level.
- This article will be extremely challenging, with many difficult words. This is a good time to encourage students to use discourse features and markers to find the main idea and supporting details in each paragraph.
Outcomes

SLO 1.2 Respond to texts with increasing independence...
SLO 1.4 Show an awareness of organizational patterns...
SLO 1.6 Interpret a range of texts...
SLO 1.7 Evaluate a given text...
SLO 4.6 Respond to and critique a variety of individual perspectives...
SLO 5.4 Show understanding of the effect of cultural background...
SLO 6.1.5 Use selective attention...

Instructional and Learning Sequence

Distribute one or both of the following readings: **Handout 4-10:** “Normal Sleep and Sleep Hygiene” (this brochure from the Canadian Sleep Society provides much exploitable content and an example of the brochure genre) and/or **Handout 4-11:** Excerpt from “Missed ZZZs, More Disease?”

- a) Students can read the excerpt from “Missed ZZZs, More Disease?” and chart the evidence for the two points of view expressed in the excerpt.
- b) Underline the words or expressions that indicate opinions or controversy.
- c) Discuss which side seems to have the strongest arguments. This is an excellent text for practising critical thinking.

The optional listening is an interview with Dr. Vanessa Auld, geneticist in the department of zoology at the University of British Columbia, who talks about the genetics of sleep cycles.

- d) Ask the students if any of their beliefs about sleep changed after the readings.
- e) For fun, have students complete **Handout 4-12:** “Guess How Much Sleep These Animals Need?” and discuss the answers as a class.

<table>
<thead>
<tr>
<th>Language Features</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>correlate</td>
<td></td>
</tr>
<tr>
<td><strong>Idioms:</strong> morning person, night h awk</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structures</th>
<th>Discourse Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>review second person and imperative verb form</td>
<td>use of second person and imperative to give instructions</td>
</tr>
<tr>
<td></td>
<td>brochure format</td>
</tr>
<tr>
<td></td>
<td>use of questions for subheadings</td>
</tr>
<tr>
<td></td>
<td>words or expressions that indicate opinions or controversy</td>
</tr>
</tbody>
</table>
Student Learning Tasks

Read Handout 4-10: “Normal Sleep and Sleep Hygiene” and examine the brochure format.

Read Handout 6: Excerpt from “Missed ZZZs, More Disease?”

a) Chart the evidence for the two points of view expressed. (I)
b) Underline the words or expressions that indicate opinions or controversy. (I)
c) Discuss which side seems to have the strongest arguments. (C)
d) Discuss whether your beliefs about sleep have changed. (C)
e) Complete Handout 4-12: “Guess How Much Sleep These Animals Need?” on the sleep needs of various animals (I) and discuss the answers (C).

Teacher Notes and References

Handout 4-10: “Normal Sleep and Sleep Hygiene”

Handout 4-11: Excerpt from “Missed ZZZs, More Disease?”

The readings could provide a springboard for discussion of cultural attitudes towards what constitutes “good sleep.”

Optional Listening

CBC, Quirks and Quarks, Feb. 1, 2001 <www.cbc.ca/quirks/archives/00-01/feb1001.htm> (the radio text draws on vocabulary from earlier readings)

Handout 4-12: “Guess How Much Sleep These Animals Need?” (quiz and answer sheet for teachers)
Outcomes

SLO 2.1 Show sufficient control over linguistic structures...
SLO 2.4 Use the steps of the writing process...
SLO 6.1.4 Use functional planning...
SLO 6.1.6 Use self-monitoring to check...
SLO 6.2.1 Use resourcing to access...
SLO 6.2.5 Use deduction and induction...
SLO 6.2.11 Use transfer...
SLO 1.3 Develop and express a personal position in a variety of ways...
SLO 2.1 Show sufficient control over linguistic structures...

Instructional and Learning Sequence

Finish writing tasks as introduced earlier, using the process approach.

Roundup

Journal

If you could choose your own schedule during the school year, what time would you wake up, start school, and go to bed? What effect does your own school start time or any other factor have on your own well-being?

Learning Log

Record several ways that you can indicate your statements are opinion (even well-supported opinion) or that you may not be completely certain of the information.
<table>
<thead>
<tr>
<th>Student Learning Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete writing tasks as introduced earlier, using the process approach. (I)</td>
</tr>
<tr>
<td>Write a journal entry answering the questions posed by the teacher. (I)</td>
</tr>
<tr>
<td>Record several ways that you can indicate your statements are opinion (even well-supported opinion). (I)</td>
</tr>
</tbody>
</table>
Sleep Quotations

1. “...to sleep, perchance to dream...”
   —Shakespeare, Hamlet, Act III, Scene 1

2. The best bridge between despair and hope is a good night’s sleep.
   —Anonymous

3. You know I can’t sleep, I can’t stop my brain
   You know it’s three weeks, I’m going insane.
   You know I’d give you everything I’ve got for a little peace of mind.
   —Beatles, “I’m so Tired”

4. The woods are lovely dark and deep,
   But I have promises to keep,
   And miles to go before I sleep,
   And miles to go before I sleep.
   —Robert Frost

5. It is a common experience that a problem difficult at night is resolved in the morning after the committee of sleep has worked on it.
   —John Steinbeck

6. When action grows unprofitable, gather information; when information grows unprofitable, sleep.
   —Ursula K. LeGuin

7. Sleep is better than medicine.
   —Proverb

8. There is a time for many words, and there is also a time for sleep.
   —Homer, (800 BC–700 BC), The Odyssey

9. To achieve the impossible dream, try going to sleep.
   —Joan Klempner

10. [Sleep is] the golden chain that ties health and our bodies together.
    —Thomas Dekker (1572 - 1632)

11. “I reached for sleep and drew it round me
    like a blanket muffling pain and thought together
    in the merciful dark.”
    —Mary Stewart

12. “Methought I heard a voice cry ‘Sleep no more! Macbeth does murder sleep,’ the innocent sleep,
    Sleep that knits up the ravell’d sleave of care,
    The death of each day’s life, sore labour’s bath,
    Balm of hurt minds, great nature’s second course,
    Chief nourisher in life’s feast.”
    —Shakespeare. Macbeth (2.2.46-51)
School Start Times

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Experts divide sleep into two basic categories based on the electrical activity in the brain. During rapid eye movement (REM) sleep, the pulses are short and fast. It is sometimes called paradoxical sleep because the brain seems to be as busy as when it’s awake. Our most vivid dreams occur during REM sleep. Higher parts of the brain dedicated to decision making and some kinds of memory are quiet, while areas involved in emotion are active. REM sleep may be one way the brain processes the unruly emotional content of our lives.

Slow wave sleep (SWS) is characterized by relatively slow waves of electrical activity. Various restorative metabolic processes take place during this phase. Researchers have divided slow wave sleep into four stages defined by brain activity and ease of wakening, with stages 3 and 4 being the deepest.

The quality of sleep changes with age. Starting at about age 65—some experts say it happens sooner—the brain struggles to get into the deeper stages (3 and 4) of slow wave sleep. At age 75, it may not be able to get into stage 4 at all. This may explain why older people are easily awakened by noise and don’t feel well rested even after an apparently full night of sleep. REM also changes. Half of the sleep that infants and young children get is REM. In adults, REM plateaus at 20% to 25%.

Excerpt from “Sleep Well to Age Well.” *Harvard Health Letter* 27.7 (May 2002).
Excerpt from The Consequences of Insufficient Sleep for Adolescents

by Ronald E. Dahl, M.D.

Links Between Sleep and Emotional Regulation

Any review of adolescent lifestyles in our society will reveal more than a dozen forces converging to push the sleep/arousal balance away from sleep and toward ever-higher arousal. What harm could there be in trying to push back a little toward valuing sleep? The potential benefits, according to Dr. Dahl, seem enormous.

Adolescents often “get by” with relatively little sleep, but it may be far less than they need. The observations of many parents, educators, and clinicians are in close agreement with a wealth of scientific data about the growing frequency of this worrisome pattern of behaviour. As discussed in other articles in this special section, there has been recent progress in understanding many of the factors that contribute to adolescent sleep loss, including the role of early school starting times and the role of various biological and social influences on adolescents’ self-selected bedtimes.

The increasing evidence that teenagers seem to be getting less sleep leads inevitably to the pragmatic question “How much sleep do adolescents really need?” Unfortunately, the medical/scientific answer to this question seems tautological. Sufficient sleep is defined as “the amount necessary to permit optimal daytime functioning.”

As impractical as that answer may appear, there are two important reasons for such a definition. First, sleep requirements can be remarkably different across individuals. Second, at a physiological level, sleep and waking states are closely intertwined aspects of a larger system of arousal regulation. (Sleep researchers often use the Chinese symbol of yin/yang to designate the interrelationship of sleep/wake states.)

At the centre of this discussion is a critical and pragmatic point: any evaluation of the sleep habits of adolescents must include a careful consideration of the waking consequences of sleep loss. The question becomes, in essence, “What are the daytime signs of diminished functioning that indicate insufficient sleep?” While there is a shortage of well-controlled research studies that seek to answer this question, this article focuses on the convergence of evidence suggesting that changes in mood and motivation are among the most important effects of sleep loss. Thus an important place to begin looking for evidence of insufficient sleep among adolescents is in the area of emotional or behavioural difficulties.

(continued)
The Consequences of Insufficient Sleep for Adolescents (continued)

There is no shortage of epidemiological and clinical studies documenting recent increases in the rates of many psychiatric disorders among adolescents. Certainly many complex factors are likely to have contributed to the emotional and behavioural problems of teenagers, but the possible link to adolescent sleep patterns bears some scrutiny. There is clear evidence that sleep loss can lead to the development or exacerbation of behavioural and emotional problems. The key question is “How great is the contribution of sleep deprivation to these problems?” The magnitude of this link remains an open question that can only be answered through careful empirical research.

In the meantime, these issues have enormous ramifications for the fields of medicine and education with regard both to the physical and mental health of adolescents and to detriments to effective learning and social development. Many policy decisions will be influenced by our understanding and interpretation of the importance of sleep in these areas.

In this article I provide an overview of current scientific and clinical information regarding the consequences of insufficient sleep in adolescents. I pay particular attention to links between sleep and emotional regulation. The following is a brief outline of the main points to be presented:

1. Sleepiness. This is the most direct consequence of adolescent sleep loss, and it manifests itself most significantly in difficulty getting up on time for school and in falling asleep in school. These problems can further contribute to conflicts with parents and teachers and to poor self-esteem. Sleepiness is also associated with a strong tendency toward brief mental lapses (or micro-sleeps) that greatly increase the risk of motor vehicle and other kinds of accidents.

2. Tiredness. This is a symptom of sleep loss and includes changes in motivation—particularly difficulty initiating behaviours related to long-term or abstract goals and decreased persistence in working toward goals.

3. Mood, attention, and behaviour. Sleep loss can have negative effects on the control of mood, attention, and behaviour. Irritability, moodiness, and low tolerance for frustration are the most frequently described symptoms in sleep-deprived adolescents. However, in some situations, sleepy teenagers are more likely to appear silly, impulsive, or sad.

4. Impact of emotional and behavioural problems. Emotional arousal and distress can cause both difficulty falling asleep and sleep disruptions. Behavioural problems and family chaos can contribute to even later bedtimes and to sleep schedules that are ever more incompatible with school schedules.

5. Bi-directional effects. There are bi-directional effects between sleep and behavioural/emotional problems. It can be difficult at times to identify the causal links. For example, a depressed adolescent with severe sleep problems may be showing sleep disturbances that stem from depression or mood problems that stem from sleep disruption. Sleep loss can also contribute to a negative spiral or vicious cycle of deterioration. That is, sleep loss can have a negative effect on mood and behaviour, which leads to subsequent emotional/behavioural difficulties that further interfere with sleep. This produces a sequence of negative effects in both domains. In some clinical cases, such negative spirals appear to be a pathway to withdrawal from school or serious psychiatric problems.
How much sleep do you need?

Humans adapt to the 24-hour cycles of light and dark using their internal clocks (circadian rhythms). These clocks dictate that adults have one major episode of sleep at night typically lasting about 8 hours - ranging from 6 to 9 hours per night. Each person must determine his or her own sleep need. You can determine this ideal amount of sleep by simply paying attention to whether or not you feel rested in the morning and alert throughout the day. If no amount of sleep will make you feel rested on the next day, then you may want to seek medical advice, including being evaluated for a sleep disorder. People tend to sleep about 30 minutes longer on weekends, indicating that they may be accumulating a sleep debt during the week. It is important to understand that you cannot “catch up” on lost sleep, or store sleep for the future, by getting more on weekends! This is because lost sleep on any given night has immediate consequences for the very next day (e.g. driving, work performance, memory and learning). Research indicates that sleep loss impairs your response time, motor ability, visual acuity, memory and attention.

What is a typical night’s sleep?

The depth and character of sleep change in a predictable manner across the night. Healthy, young adults will fall asleep in 10-20 minutes after “lights out”. Thereafter, the sleeper will cycle through 4 different stages of sleep in the course of the night. As you fall asleep, your thoughts begin to wander and your awareness of the outside world is reduced (this is called “stage 1”). As much as 60-60% of the night is spent in stage 2 sleep, a relatively light stage of sleep (i.e. easy to awaken from sleep). Stages 3 and 4, occurring predominately in the first half of the night, are referred to as deep sleep since it requires a more meaningful or intense stimulus to awaken the sleeper (e.g., baby’s cry or your own name). Together, stages 1 through 4 are referred to as non-REM sleep. REM sleep (or rapid eye-movement sleep) will occur approximately every 90 minutes throughout the night. You can thus expect to experience 4-5 REM sleep episodes per night. The first REM period is typically very brief, lasting less than 10 minutes, while the final episode may continue for more than an hour. This means that you get most of your REM sleep during the second half of the night. REM sleep is commonly associated with dreaming because your most vivid and bizarre dream reports occur during this stage of sleep, although dreaming or mental imagery takes place in all stages of sleep. The sleep/wake histogram below illustrates how a healthy, young adult would cycle through the stages of sleep on a typical night.

Changes in sleep across the lifespan

The timing and duration of sleep change dramatically as we age. A newborn baby may sleep as much as 16 hours per day. Adolescents will sleep 9 hours on average although they prefer to go to bed later and wake up later than the usual 11 to 7 bedtime. This shift to a later sleep time is a normal pattern for teens; however, their school schedules preclude this desired pattern and as a result many teens are chronically sleep deprived. Sleep in adults can be quite organized and efficient (meaning they sleep at regular clock times, fall asleep quickly, and have very little wakefulness during the night); however, lifestyle factors, behaviours, and poor sleep habits can grossly disrupt sleep in otherwise healthy adults. During later life, sleep becomes shorter in duration (about 6 hours on average); there is less time spent in deep sleep; arousals during the night are more frequent and for longer periods of time; and there is a tendency to nap during the day. Older adults prefer to go to bed earlier and wake up earlier. This shift to an earlier sleep time is a normal pattern for older adults. Just as the teenager does not stay in bed later because they are lazy, the older adult does not go to bed earlier for lack of anything better to do with their time — the timing of when we sleep and when we wake is governed by our internal circadian clocks. If you find that you are sleeping less at night than you used to, yet your daytime functioning is not impaired, then there may be no cause for concern about these changing sleep patterns. If you are disturbed by the fragmented nature of your sleep at night (and long bouts of wakefulness during the night specifically), it is not recommended that you compensate with naps.

What about naps?

Daytime napping is natural for most toddlers. At about age 6 to 12 years, however, sleep begins to occur in a single nighttime episode. Napping behaviour is usually put aside until retirement age. Naps are generally only acceptable for people who have no difficulty falling asleep or staying asleep at night. Otherwise, the time you spend napping during the day may take away from your total sleep time at night. The optimal duration for a nap, whether during the daytime or while on the job for shift-workers, is 10-20 minutes. Twenty minutes is sufficient to feel rested, yet short enough not to interfere with nighttime sleep or your alertness on the job upon awakening. If you cannot get through the day without a long nap, despite also sleeping long hours at night, you should be evaluated for a sleep disorder.

Tips for a good night’s sleep

1. Make sleep a priority! In today’s busy world, too many people simply do not make the time for sleep. Are you allowing yourself enough time in bed to get the sleep you need? It is a good idea to keep track of how much sleep you are getting by keeping a “sleep diary.” You can do this by making note of your lights-out and wake-up times each day, taking care to note any time out of bed during the night. Also keep track of
Normal Sleep and Sleep Hygiene (continued)

How to complete a sleep/wake and activity diary:
Each morning, make note of the time you went to bed and woke up, taking care to mark any time out of bed during the night. Throughout the day, also keep track of the timing of your major meals, exercise and consumption of alcohol or caffeine. Keep track of your habits for a 2-week period to gain some insight into your sleep/wake habits.

2. Practice good sleep hygiene! If you have trouble getting the sleep you need, work shifts, or simply cannot seem to find the time for sleep, then “sleep hygiene” is a practice that you need to work on more than others.

- Go to bed only when sleepy. Try a relaxing bedtime routine (e.g., soaking in a bath).
- Establish a good sleep environment with limited distractions (noise, light, temperature).
- Avoid foods, beverages, and medications that may contain stimulants.
- Avoid alcohol and nicotine before going to sleep.
- Consume less or no caffeine.
- Exercise regularly, but do so around midday or early afternoon. Over-training or exercising too much is not advisable.
- Try behavioural/relaxation techniques to assist with physical and mental relaxation.
- Avoid naps in late afternoon and evening.
- Avoid heavy meals close to bedtime.
- Avoid fluids before going to sleep.
- Use the bed only for sleep and intimacy (do not eat, read or watch TV in bed!)
- Establish a regular waketime schedule.

Prepared for the CSS by:
Kimberly Cote, PhD,
Department of Psychology, Brock University

NORMAL SLEEP AND SLEEP HYGIENE

CANADIAN SLEEP SOCIETY
2003
Excerpt from “Missed ZZZs, More Disease?”

The first part of the article describes research studies that connect insufficient sleep to a number of chronic illnesses. Then it acknowledges the other side…

Virtue or Indulgence?

Some scientists remain skeptical that sleeping 8 hours should be the next great health virtue. They say that getting from the current evidence to a firm link between sleep loss and disease requires a giant leap of faith.

“Some people don’t have time to sleep, or they’d rather watch television. Should we condemn them before the evidence is in?” asks Daniel F. Kripke of the University of California, San Diego. Kripke argues that telling people that they’ll get sick if they don’t sleep enough may, ironically, worry them into insomnia.

Kripke and his colleagues published results in February that, on the surface, contradict the idea that more sleep is good for you. During a large epidemiological study lasting 6 years, people were more likely to die if they initially reported sleeping 7.5 hours or more a night than if they reported sleeping 5.5 to 7.5 hours a night. The researchers took into account such factors as age, weight, diagnosed illness, and medication use.

The amount that the average person in the United States sleeps per night, about 7 hours, is consistent with good health, Kripke concludes. “People who are saying you should sleep more don’t have the evidence,” he adds.

Anything more than 7 hours is optional sleep, which can be taken for relaxation and indulgence but is not necessary for good health, agrees sleep scientist Jim A. Horne of Loughborough University in England.

Vgontzas disagrees. Underlying depression and sickness probably explain the apparent association between sleeping 8 or more hours and increased mortality in Kripke’s study, he says.

However, neither Horne nor Kripke is swayed by the studies that show physiological changes in sleep-deprived subjects in the lab. The changes are probably real, they agree, but may not be meaningful—either because they’re not severe enough to cause long-term health effects or because they’re artifacts of the experimental situation.

The immune system probably does crank up and go on red alert when a person is awake longer, Horne explains. After all, a body is more likely to come across pathogens when it’s up and about. But there’s no evidence that this activity undermines health, he says.

The argument that people are evolutionally programmed to sleep 8 or 9 hours a night doesn’t hold up, at least in European history, Horne adds. Hundreds of years ago, people worked 14- or 15-hour days and were lucky to get 6 hours of sleep at night, he says. Moreover, their sleep patterns were different than those of modern slumberers. In England, people went to bed an hour after sundown, got up a few hours later for a midnight meal, and then slept a few more hours until sunup, Horne says. People are probably designed to sleep 6 or 7 hours at night and take a short afternoon nap, he suggests.

(continued)

Source: <www.sciencenews.org>.
Bleary Picture

Research on sleep deprivation and health is still in its infancy, Van Cauter admits. Nevertheless, she maintains that 8 or more hours of sleep a night is optimal. “To suggest to people that you can maintain average sleep time of 6 hours and get on the road and drive your truck is criminal,” she asserts. It’s too early to say whether sleep loss causes disease, but sleeping certainly hinders performance and diminishes safety, she says.

There’s no reason to believe that sleeping more than 8 hours could be harmful or that insomnia could be good for you, Vgontzas adds. “My general appraisal of the literature is, in terms of more or less normal variations in sleep amount and effects on health, we really don’t know,” reflects sleep specialist Alan Rechtschaffen of the University of Chicago. There’s a consensus that the extreme—below 6 hours a night—isn’t advisable, he says. Beyond that, distinguishing the health effects, if any, of 6 versus 7 versus 8 hours of sleep is going to take large, well-controlled studies that follow people over long periods. Optimal sleep also probably varies with age and gender, says Vgontzas.

So, as to whether millions of cases of obesity, diabetes, and cardiovascular disease could be prevented if people in the United States were simply to increase their sleep from 7 to 8 hours a night, the issue hasn’t been put to bed. But the early data are at least provocative. “We have all the dots or a lot of the dots, and it looks like there’s a picture there, but the science that actually connects those dots hasn’t been done yet,” Dinges says.
Choose one of the following animals for each blank below:

dogs       pythons       human       tigers

giraffes   cats          children   cows

brown bats  horses         African elephants

If you don’t know, don’t worry. Just make a guess!

1) ____________ sleep 12 or more hours every 24 hours. They sleep mostly at night, but also during the day.

2) ____________ may be big, but they sleep only 3 hours every 24 hours.

3) Lucky for us humans, slimy ____________ sleep 15 to 20 hours and ____________ sleep 16 hours every 24 hours.

4) ____________ and ____________ sleep only 4 hours every 24 hours because they need more time to eat.

5) ____________ need at least 9 hours of sleep every 24 hours!

6) When they aren’t eating insects, ____________ sleep nearly 20 out of 24 hours every day.

7) ____________ don’t need pillows, because they sleep less than 2 hours each day standing up!

8) Some types of ____________ sleep more than others, usually 10 hours every 24 hours.

(see over for answers)
Guess How Much Sleep These Animals Need?—Answers

1) **Cats** sleep 12 or more hours every day. They sleep mostly at night, but also during the day.

2) **African elephants** may be big, but they sleep only 3 hours a day. They need the rest of the day to consume large amounts of food.

3) Lucky for us humans, slimy **pythons** sleep about 15 hours (if they are hungry) or as many as 20 hours after feeding. **Tigers** sleep 16 hours a day. Both animals conserve precious energy for hunting.

4) **Horses** and **cows** sleep only 4 hours each day because they need more time to eat. Like elephants, horses and cows need plenty of time to eat and digest enough food.

5) **Human children** should sleep at least 9 hours each day! This is an important point to emphasize with your students.

6) When they aren’t eating insects, **brown bats** sleep nearly 20 hours each day. As with pythons and tigers, bats need to conserve energy for hunting.

7) **Giraffes** don’t need pillows, because they sleep less than 2 hours each day standing up! Giraffes sleep in short bursts. Some scientists speculate that they “semi-sleep” while they are eating as well—a form of “zoning out.”

8) Some types of **dogs** sleep more than others, but most sleep around 10 hours a day. Some, however, sleep as many as 14 hours a day.
This lesson will focus on a discussion of alternative medicine that eventually focuses on herbal medicines. Students will do research on a specific herbal remedy, design an experiment to test its effectiveness, and present it to the class. Students will also develop rubrics to judge each other’s experiments. Some related academic tasks are: skimming, scanning, comparing and contrasting, making an oral presentation, conducting and referring to research, participating in a discussion, understanding explicitly stated information, extracting salient points, reading critically, evaluating a text, and expressing purpose, meaning, and method.
Sequence 1

Activation

Introduce the idea of conventional and alternative medicines.

a) Ask students how they would define the term “alternative medicine.” As students contribute their ideas, write them on the board. Encourage students to use definition patterns learned in previous lessons.

   Next, have students open up the Internet resource “Alternative Medicine” and scroll down to the subheading “But exactly what is alternative medicine?”

b) Have them compare their definitions with the information given there.

c) Then, using paraphrasing, students rewrite the five points used in defining alternative medicine presented in the article. Pair students and have them read each other’s paraphrases and comment on them. (The teacher may take these in to mark.)

d) Finally, have students brainstorm to create a list of the types of alternative medicine they know about. Record this list on the board.

<table>
<thead>
<tr>
<th>Language Features</th>
<th>Vocabulary</th>
</tr>
</thead>
<tbody>
<tr>
<td>names of types of alternative medicine</td>
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</table>

<table>
<thead>
<tr>
<th>Discourse Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>definitions patterns (review)</td>
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<tr>
<td>technique of paraphrasing (review)</td>
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<table>
<thead>
<tr>
<th>Academic Language Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>defining</td>
</tr>
<tr>
<td>comparing</td>
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<tr>
<td>classifying</td>
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</tbody>
</table>
a) Define the term “alternative medicine” using previously learned definition patterns. (C)

b) Compare your definition with the information given in the Internet Resource under the heading “But what is alternative medicine?” (I)

c) Using paraphrasing, rewrite the five points used in defining alternative medicine presented in the article. Have a partner read and comment on your paraphrasing. (I) (G)

d) Brainstorm a list of types of alternative medicine. (C)
**Outcomes**

<table>
<thead>
<tr>
<th>SLO 5.4</th>
<th>Show understanding of the effect of cultural background…</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO 6.1.3</td>
<td>Use directed attention…</td>
</tr>
<tr>
<td>SLO 6.2.5</td>
<td>Use deduction and induction…</td>
</tr>
<tr>
<td>SLO 6.2.7</td>
<td>Use elaboration…</td>
</tr>
</tbody>
</table>

**Instructional and Learning Sequence**

**Step 1**

Students focus on herbal medicine. Ask: Is the attitude toward the use of herbal medicines different in eastern and western cultures? Why? Discuss as a class.

Ask: Is the attitude toward conventional Western-style medicine different in Eastern and Western cultures? Why?

Discuss as a class.

**Step 2**

Distribute Handout 4-13: “Survey: Personal Experience with Herbal Remedies,” a survey about personal experience with herbal remedies. Have students fill it out.

As a class, look at the results of the survey. Ask students for their responses and record the totals on a master copy on the overhead or on the board. Students should briefly share why they answered as they did. Leave the survey and results on the board for later use.

**Language Features**

**Vocabulary**

- immune system, conventional medications, viable, medical practice, herbal supplements

**Discourse Features**

- discussion expressions (review)

**Academic Language Functions**

- explaining, describing, comparing, contrasting

**Step 3**

Provide students with Handout 4-14: “Americans Gamble on Herbs as Medicine.”

a) Have students skim the whole article.

b) Next, have them scan the first 13 paragraphs to answer the language questions (1–5) and the content questions (1–9) in Handout 4-15: “Focus Questions: ‘Americans Gamble on Herbs as Medicine’”

c) As a class, discuss the answers. Record the answers in point form on the board.

**Note:** Language questions based on the article contain the other language features of the lesson.

**Language Features**

**Vocabulary**

- as required from the article

**Structures**

- Students should note the imperative verb forms in bold used in the questions and instructions in Handout 3.
Student Learning Tasks

Discuss attitudes toward herbal medicine in Eastern and Western cultures. (C)

Complete Handout 4-13: “Survey: Personal Experience with Herbal Remedies.” (I)

As a class, look at the results of the survey and share why you answered as you did. (C)

Teacher Notes and References

You can also ask the students to comment on changing attitudes toward medical treatment in various cultures.

Handout 4-13: “Survey: Personal Experience with Herbal Remedies”

Handout 4-14: “Americans Gamble on Herbs as Medicine”

Handout 4-15: “Focus Questions: ‘Americans Gamble on Herbs as Medicine’”

a) Skim Handout 4-14: “Americans Gamble on Herbs as Medicine.” (I)

b) Scan the first 13 paragraphs to answer the focus questions in Handout 4-15: “Focus Questions: ‘Americans Gamble on Herbs as Medicine’.” (I)

c) Discuss the answers as a class. (C)
Step 4

Give students a list of common herbs and plants to be researched in pairs. Remind them to look for reliable print and Internet sources as they do their research. (See the Internet resource link on antibacterial spices.) There are many reliable sources of information on the Internet. Pair students and have each pair try to find one reliable source of information to share with the class. See Module 1, Topic 4 for resources on how to evaluate websites.

As a guide in doing their research, students should address the following points:

- background information
- uses for/effects of the herb
- problems/dangers associated with the herb
- evidence that it is effective
- include a picture of the herb in its natural form

Remind students to take point-form notes in their own words.

After completing their research, students will design a scientifically valid experiment to test the effectiveness of their herbal remedy. (They will not necessarily conduct these experiments, unless the teacher chooses to add this to the lesson.) Following the guidelines given in Handout 4-16: “Designing an Experiment: Research and Presentation of a Scientifically Valid Study to Test the Effectiveness of an Herbal Remedy,” students will use the following headings: title, background information, materials, hypothesis, and procedures. These experiments will be presented to the class. Students can use a poster presentation or PowerPoint.

Language Features

<table>
<thead>
<tr>
<th>Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss verb tenses needed to write the experiment (present tense for scientific truths, past simple for history/background, imperative for procedures, etc.).</td>
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</table>

<table>
<thead>
<tr>
<th>Discourse Features</th>
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<tbody>
<tr>
<td>point-form notes</td>
</tr>
<tr>
<td>format of an experiment</td>
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<table>
<thead>
<tr>
<th>Academic Language Functions</th>
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</thead>
<tbody>
<tr>
<td>explaining, describing, informing, analyzing</td>
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</table>
### Student Learning Tasks

**Assignment**

With a partner, research a common herb addressing the five-point criteria. Share results with the class. (G) (C)

Develop a scientifically valid experiment designed to prove the hypothesis following the guidelines given in **Handout 4-16**: “Designing an Experiment: Research and Presentation of a Scientifically Valid Study to Test the Effectiveness of an Herbal Remedy.” (G)

Present experiments to the class as poster presentation or PowerPoint. (G) (C)

### Teacher Notes and References

- **Internet Resource:** List of Top Antibacterial Spices
  <www.carleton.ca/jmc/cnews/30031998/chart.html>

- **Handout 4-16:** “Designing an Experiment: Research and Presentation of a Scientifically Valid Study to Test the Effectiveness of an Herbal Remedy”

Students should look at Western and Eastern herbs and plants. Here are some suggestions: echinacea, ginseng, goldenseal, St. John’s wort, kava root, gingko biloba, saw palmetto, kyolic, ma huang, sassafras, valerian root, cat’s claw, foxglove, wormwood, chapparral, comfrey, willow-bark, clove, dandelion root. (There are many others you may want to include.)
### Outcomes

| SLO 1.4 | Show an awareness of organizational patterns... |
| SLO 2.1.4 | Refine pronunciation to increase intelligibility... |
| SLO 2.2 | Use several visual techniques... |
| SLO 2.3.2 | Demonstrate increasing awareness of... rhetorical forms... |
| SLO 2.3.3 | Produce effective oral presentations. |
| SLO 4.6 | Respond to and critique a variety of individual perspectives... |
| SLO 5.7 | Select and present ideas...keeping in mind the intended audience. |
| SLO 6.2.7 | Use elaboration... |
| SLO 6.3.2 | Use co-operation... |

### Instructional and Learning Sequence

### Evaluation

The class will design a set of rubrics they feel will help them fairly evaluate the experiments. (They can meet in groups of four to brainstorm and then write up their rubrics.)

Groups share their results with the class; students must come to a consensus on the best set or combination of sets of rubrics.

Students will present their experiments to their classmates. They will have the experiment recorded in proper written form and will discuss it orally with the class. Each group member should take an equal load. The class will comment and ask questions. Teachers will evaluate these experiments, as well as the presentation given by each group.

**Note:** At this point, students may take the initial survey again and compare the totals from the first survey to the totals this time. Have opinions changed now that students are more knowledgeable?

<table>
<thead>
<tr>
<th>Language Features</th>
<th>Vocabulary</th>
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<tbody>
<tr>
<td></td>
<td>dependent on rubrics</td>
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<table>
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<tr>
<th>Discourse Features</th>
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</tr>
</thead>
<tbody>
<tr>
<td>format of rubrics</td>
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<tr>
<th>Academic Language Functions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>classifying, evaluating, justifying and persuading, explaining</td>
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</tbody>
</table>
In groups of four, brainstorm and then write up a rubrics to be used to evaluate the experiments written up previously. (G)

Groups share their rubrics with the class and reach consensus on the best set or combination of sets of rubrics. (G) (C)

Present your experiment to the class and answer questions from classmates. (G) (C)
### Outcomes

<table>
<thead>
<tr>
<th>SLO 1.2</th>
<th>Respond to texts with increasing independence…</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO 2.1.1</td>
<td>Analyze and edit texts…</td>
</tr>
<tr>
<td>SLO 2.1.3</td>
<td>Use developing control of grammatical features…</td>
</tr>
<tr>
<td>SLO 2.3.1</td>
<td>Use the structures and language features…</td>
</tr>
</tbody>
</table>

### Instructional and Learning Sequence

### Roundup

Ask students to respond to the following question: What do you feel is the most responsible way to treat ailments: conventional medicine, alternative medicine, or a combination of both?

OR

Write a personal journal entry about your own experience with any form of alternative medicine, especially one that is non-herbal (e.g., acupuncture).

### Language Features

#### Discourse Features

discourse markers to express opinion (review)

#### Academic Language Functions

evaluate, justify
What do you feel is the most responsible way to treat ailments: conventional medicine, alternative medicine, or a combination of both? (I)

OR

Write a personal journal entry about your own experience with any form of alternative medicine. (I)
Survey: Personal Experience with Herbal Remedies

Answer the following questions:

1. Have you ever taken an herbal remedy?  Yes___ No___
   (If no, skip to question 3.)

2. Mark with a tick each of the following health problems that have caused you to try an herbal remedy:
   - sleeplessness  _____
   - lack of energy  _____
   - headache  _____
   - cold  _____
   - stomach ache  _____
   - allergies  _____
   - depression  _____
   - forgetfulness  _____
   - weight loss  _____
   - weight gain  _____
   - beauty aids*  _____ (*makeup, hair products, deodorants)
   - building immune system  _____
   - building muscle  _____
   - skin disorders  _____
   - aches and pains  _____
   - other*  _____ (*describe)

3. Do you take conventional medications on a regular basis?  Yes___ No___

4. With which of the following statements do you most agree? Place a tick beside each.
   - Herbal medicine is an ancient, worthless practice that has no basis in science.
   - Herbal medicine may work for some, but I prefer to take conventional medicines.
   - Herbal medicine may be a viable medical practice, but I need more information to justify its use.
   - Herbal remedies are as reliable a medical practice as conventional medicines.
   - Herbal medicine is a better way to treat many illnesses than is conventional medicine.
   - I would be confident in taking a combination of herbal and conventional medicines.
   - I believe in prescriptive rather than preventative medicine.
   - I do not believe in taking any kind of medicine.

5. Are herbal supplements as closely regulated as other drugs?  Yes___ No___

6. Do you believe that herbal supplements are safe?  Always___ Sometimes___ Never___

Herbal medicine, the mainstay of therapeutics for centuries before modern purified drugs relegated it to the status of near-quackery, has in the last five years emerged from the fringes of health care with an astonishing flourish and now shows clear signs of joining the medical mainstream.

Despite many cautionary tales about adulterated and even dangerous products, herbs formulated as capsules, tinctures, extracts and teas—and increasingly as additions to common foods like potato chips and fruit drinks—are now routinely used by a third of American adults seeking to enhance their health or alleviate their illnesses. Each day the herbal realm wins new converts, particularly among those who have become disillusioned with the cost and consequences of traditional drugs, distrustful of conventional physicians and convinced that “natural” equals “good.”

Yet, because herbal products are classified as dietary supplements, not drugs, and face none of the premarket hurdles drugs must clear, consumers have no assurance of safety or effectiveness. Indeed, scores of products sold in the United States are listed by European and American authorities as ineffective, unsafe or both, and manufacturing standards to assure high quality have been proposed but are not yet in force.

Thus, countless consumers are wasting their money on useless products or jeopardizing their health on hazardous ones. Among the serious side effects that have been linked to herbal remedies are high blood pressure, life-threatening allergic reactions, heart rhythm abnormalities, mania, kidney failure and liver damage. A few widely available products, including sassafras and comfrey, contain known carcinogens.

At the same time, according to a report last year in the journal Psychosomatics, unsuspecting consumers “have used herbal remedies with good results only to discover that the benefit was actually derived from the presence of undisclosed medicines,” including steroids, anti-inflammatory agents, sedatives and hormones.

“The lack of quality standards is the No. 1 problem in the whole industry,” said Dr. Varro Tyler, emeritus professor of pharmacognosy (the study of active ingredients in plants) at Purdue University. Tyler, who has no financial connection to herbal products and is arguably the nation’s leading independent expert on herbal medicine, said: “I feel sorry for the typical consumer. How is he or she to know what is best, what products are reliable and safe? Even when a label says the product has been standardized, the consumer has no way to know if it actually meets that standard.” And even if an herbal product has been reliably made in some standard dose, it does not mean that scientific studies have shown it to be effective.

The industry itself is promoting a “good manufacturing practices” doctrine. Annette Dickinson, director of scientific and regulatory affairs for the Council for Responsible Nutrition, a trade organization for producers of dietary supplements, said a consortium of associations submitted a document of manufacturing standards to the Food and Drug Administration two years ago. Although such a standard would say nothing about an herb’s safety or effectiveness, it would result in reliable methods that the industry would have to use to assure the identity and quality of its products. The agency has issued a notice of proposed rules but no final ruling as yet.

Nonetheless, botanicals—as herbal products are more accurately known—are enjoying an annual retail market approaching $4 billion, up from $839 million in 1991 and growing about 18 percent a year. Hundreds of products formulated with virtually no government oversight are crowding shelves of health food stores, food markets and pharmacies nationwide. Supplements are also

widely sold by marketers like Amway, through
catalogs and on the Internet.

Now, even major pharmaceutical companies like
Warner Lambert, American Home Products, Bayer
and SmithKline Beecham are introducing herbal
products, adding respectability to this
marginalized market.

Some herbs—like echinacea, goldenseal,
American ginseng and wild yam—have become
so popular that their continued supply from
natural sources is in danger. As the plants become
scarcer and more expensive, products containing
them are increasingly likely to be adulterated and
may even contain none of the herb listed on the
label. Peggy Brevoort, president of East Earth
Herb Inc., a company in Eugene, Ore., that
produces botanicals, said the demand for St.
John’s wort, used for mild depression, and kava, a
calmative said to reduce anxiety, now exceeds
their supply, introducing the “danger of
adulteration” by “unscrupulous dealers.”

At the same time, two major new publications—a
1,244-page *Physicians’ Desk Reference for Herbal
Medicines*, produced by the same company that
publishes the *Physicians’ Desk Reference*, and an
English-language edition of Germany’s
therapeutic guide to herbal medicines, *The
Complete German Commission E Monographs*
—have been issued to help educate physicians,
pharmacists and interested consumers about the
known uses, proper dosages and safety concerns
of more than 600 botanicals now sold in this
country. The evaluations in both books are based
on studies, most done in Germany and reviewed
by teams of experts.

Last month, the National Institutes of Health
began listing on the Internet international
bibliographic information on dietary supplements,
including herbal products. The address is

In addition, a few medical and pharmacology
schools have recently introduced courses in
phytomedicine, the study of botanicals. And next
month the American Pharmaceutical Association
will conduct a two-day program on herbal
medicine as part of its annual meeting. Still, most
doctors remain wary of botanicals, especially
when patients choose self-medication with plant
extracts over established medical remedies.

The very act of Congress that has fostered this
growth—the 1994 Dietary Supplement Health and
Education Act—has also permitted chaos to reign
in the botanical marketplace, with no mechanism
to assure that products are safe or effective.

Pushed heavily by Republican Senator Orrin
Hatch of Utah, the home base of many supplement
makers, and passed over the objections of the
FDA, the law created a new product class, the
dietary supplement, that was not subject to
regulations applied to drugs. Now any substance
that can be found in foods, regardless of amount
or action and including substances that act as
hormones or toxins, can be produced and sold
without any premarket testing or agency approval.

Marketed as neither a food nor a drug, herbal
products are not obliged to meet any established
standards of effectiveness or safety for medicinal
products, which require extensive laboratory and
clinical trials before approval. As with other
substances classified as dietary supplements, the
FDA can restrict the sale of an herbal product only
if it receives well-documented reports of health
problems associated with it. The agency took four
years, and more than 100 reports of life-
threatening symptoms and 38 deaths, to act
against ephedra, often sold as the Chinese herb ma
huang, a stimulant that can prove disastrous to
people with heart problems.

With FDA authority limited by the 1994 law, the
Federal Trade Commission, which monitors
advertising, has taken a more active role in
monitoring supplement makers.

The FTC last year took legal action against seven
manufacturers that had broken rules requiring
advertising be truthful and verifiable. The
companies were selling remedies or purported
cure-alls for ailments like impotence, cancer and
obesity.

The commission also sent e-mail warnings to
1,200 Internet sites that it said had made
“incredible claims” for drugs, devices and
supplements, including herbal remedies that would

(continued)
supposedly ward off AIDS. Also, the commission late last year issued its first set of advertising guidelines aimed specifically at the supplement industry.

Still, the current regulations have created a quagmire of consumer confusion and set up potential health crises that even industry officials say could ultimately hurt producers as well as users of herbal products. Under the 1994 law, consumers have no assurance that an herbal product contains what the label says it does or that it is free from harmful contaminants. Independent analyses of some products, particularly those containing costly or scarce herbs, revealed that some have little or none of the purported active ingredient listed on the label.

Adding to the confusion is that botanical makers are allowed to describe products only in terms of their effects on the structure or function of the body, not their potential health benefits. Thus, a product label might say “promotes cardiac function” but it cannot say “lowers cholesterol.”

Likewise, although the law does allow health warnings on the label, most manufacturers have yet to include them.

Consumers are warned, however, that federal drug safety officials are not watching the store. All botanicals must display a disclaimer on the label following the description of the product’s structural or functional role: “This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.” To which Tyler commented, “If that is true, why on earth would anyone use it?”

The seeds of the modern herbal market were sown in the ’60s when “green, organic and natural became buzzwords,” Tyler said. But they did not mature until the ’90s with the growing consumer interest in “self-care and controlling one’s destiny,” he said. Many turned to herbs as a gentler way to treat health problems and a potential tool for preserving mental and physical health.

The interest has spawned scores of Internet sites and hundreds of books on various herbs. But much of the literature is replete with poorly documented health claims and, with few exceptions (among them, Tyler’s books), advocacy prevails over objectivity.

Because plants contain a mixture of relatively diluted chemicals, they naturally tend to have milder actions, both in their therapeutic benefits and side effects, than the concentrated, single chemicals in most drugs. Thus, botanicals generally take longer to act than regular pharmaceuticals and few have the potency of a prescription, the one possible exception being saw palmetto, which a well-designed study indicated may be as helpful for an enlarged prostate as the more expensive and riskier drug, Proscar®.

The combination of chemicals in botanicals is potentially both a plus and a minus. When two or more chemicals enhance one another’s activity, the therapeutic benefit could theoretically exceed that of an isolated substance formulated as a drug. Mark Blumenthal, who heads the American Botanical Council, noted that the herb St. John’s wort, widely used in Germany and increasingly in the United States to counter mild depression, is standardized for a substance called hypericin. But, he explained, “hypericin is not directly linked to its antidepressant activity.” Rather, other substances in the herb seem to have diverse actions on brain chemicals, all of which work together to counter depression.

Equally possible, though, when using an herb with two or more active chemicals, is that one will cancel the benefits of another or introduce a hazard. Without careful chemical tests and large, well-controlled clinical trials such actions are often hard to detect.

Consumer confidence in herbal medicine is bolstered by the common but erroneous assumption that “natural” equals “safe” and the public’s failure to realize that many plants contain chemicals that are potent drugs or outright poisons. Natural laxatives like the herb Cascara sagrada are just as habit-forming and harmful to the colon as laxatives sold as drugs.

Indeed, one quarter of prescription drugs and hundreds of over-the-counter products were
originally isolated from plants. Ephedra, for example, contains a natural stimulant that is approved for use as a decongestant and bronchial dilator in some pharmaceutical products. However, when used in uncontrolled dosages or by people with certain underlying health problems, it can cause a dangerous rise in blood pressure and, in its herbal form, has been responsible for serious adverse reactions and dozens of deaths, mainly among people who inappropriately used it as a stimulant or diet aid.

Complicating the safety issue is the fact, shown in several recent surveys, that most patients fail to tell their physicians they use herbal supplements and thus sometimes risk dangerous drug interactions or endure costly tests or treatments when an herb causes an unrecognized side effect. Experts say many patients withhold information about herbal drug use because they fear being ridiculed by their doctors.

Although all German physicians must take courses on herbal remedies, only a handful of American medical and pharmacology schools offer courses in this field.

A year ago, the President’s Commission on Dietary Supplement Labels recommended that the FDA appoint a committee to evaluate the safety and effectiveness of herbal products. “This could be the most important step in the United States toward legitimizing herbal medicine,” Tyler said.

However, the agency responded that it lacked the budget to support such an effort. American physicians have completed and published only a few well-designed studies of some popular botanicals. Among them were studies showing that saw palmetto can shrink an enlarged prostate and ginkgo biloba can improve memory in patients with early Alzheimer’s disease.

The Office of Dietary Supplements at the National Institutes of Health is helping to finance a three-year multicenter study of St. John’s wort as a treatment for clinical depression and a study of plant-based estrogens as a preventive for post-menopausal health problems.

However, thousands of studies of botanicals have been completed abroad—mainly in Germany—that strongly suggest a health-promoting role for more than 200 plant products. Germany’s Commission E evaluated 380 botanicals, approving 254 as safe and reasonably effective and disapproving 126 as ineffective, unsafe or both.

The Germans use a different criterion to assess an herb’s benefits—a doctrine of “reasonable certainty” that the herb has the desired effect and is safe, Blumenthal said. Whereas standard testing of a drug for approval by the FDA can cost as much as $500 million per product—a prohibitive amount for companies to spend on botanicals that cannot be patented—tests to establish “reasonable certainty” would cost only $1 million to $2 million, Tyler estimated.

In June 1996, Dr. Robert Temple, director of medical policy for the FDA’s Center for Drug Evaluation, suggested that, rather than subjecting botanicals to the extensive tests required for drugs, the agency might consider applying less stringent criteria to assess an herb’s effects, at least when a product is to be used only for a short time. He said, “A long history of safe use might provide sufficient safety information for products that are intended for short-term use.”

More than four dozen botanicals or botanical formulations have been submitted to the agency as investigational new drugs. If any meet the agency’s criteria for safety and effectiveness and are eventually approved as drugs, they would be allowed to carry direct health claims—instead of just structure and function statements—on labels and in advertising.

Meanwhile, Dr. Joerg Gruenwald, medical director of a German phytomedicine company and primary editor of the new Physicians’ Desk Reference for Herbal Medicines, said professionals can rely on that volume for current, documented information about botanicals. The volume, to be issued annually, updates the Commission E reports and adds several hundred other products sold in the United States, listing effects, side effects and conditions in which their use is inadvisable.
Focus Questions: “Americans Gamble on Herbs as Medicine”

Answer the following questions sentences by reading the first thirteen paragraphs of the article.

I. Language:
Read the title. What does it tell you about the topic of the article that follows? What does the use of the word “gamble” suggest about the use of herbs as medicine?

1. Look in the first paragraph for the term “near-quackery.” Can you determine what it means by using context clues?

2. Find the definition for the literary term “metaphor.” Can you find a metaphor in paragraph three? Explain the metaphor and show how it is effective in describing the testing of new products.

3. In paragraph three, the word “effective” has been changed by adding a prefix in one sentence and a suffix in another. Explain the purpose of using the prefix and suffix.

4. Find at least three examples of introductory words or phrases. How are they used? What punctuation mark always follows these words and phrases? Why?

5. Find two definition patterns that we have used in previous lessons.

II. Content:

1. Explain what the increasing use of herbal medicines over traditional ones states about society as a whole.

2. Suggest why a person might choose to use an herbal medicine over a conventional Western-type treatment.

3. Explain why herbal products are not as highly regulated as drugs and how this might affect consumers.

4. Discuss the significance of the report in the journal Psychosomatics that states that “unsuspecting consumers ‘have used herbal remedies with good results only to discover that the benefit was actually derived from the presence of undisclosed medicines,’ including steroids, anti-inflammatory agents, sedatives, and hormones.”

5. Explain why Dr. Varro E. Tyler feels that “the lack of quality standards is the No. 1 problem in the whole [herbal supplement] industry.”

6. Describe how Annette Dickinson supports the “good manufacturing practices” doctrine regarding the use of herbs for medicinal purposes.

7. Herbal products are not closely regulated, yet consumers are buying them at an increasing rate. Speculate why this is occurring.

8. The natural supplies of some herbs are becoming endangered due to the popularity of herbal supplements and herbal medicine. Suggest how this is happening and predict the impact it may have on the future of the industry and on the earth.

9. Describe what informational goods and services are available about herbs and their uses. Explain what they may do to forward the trend in herbal supplements. (Students: Note the part of speech of “forward” in this question.)

Handout 4-16  Module 4: Issues in Health  
Topic 4

Designing an Experiment: Research and Presentation of a Scientifically Valid Study to Test the Effectiveness of an Herbal Remedy

In doing your research:
1. Choose an herbal remedy.

2. Observations and description: Find reliable sources that will help you answer the following questions:
   - **Explain** the history behind the use of this herb.
   - **List** the ailments this remedy is supposed to prevent, relieve, or cure. If there is more than one, choose an ailment on which to focus your research.
   - **Describe** the symptoms commonly associated with this ailment.
   - **Describe** the suggested results of taking this remedy.
   - **Discuss** the anecdotal evidence that exists showing that this remedy is effective.
   - **Document** the warnings/problems that are associated with this herbal remedy.
   - **List** any conflicting claims about the success of using this herbal remedy.
   - **Find** a picture of the herb in plant form. Where is this herb found?  
   (This information will be used as the “Background Information” section of your written experiment.)

3. Hypothesis: Think and note:
   - **Consider** the anecdotal information gathered. **Explain** some of the possible causes for it.
   - Of these possibilities, **choose** the one you think is most reasonable. **Decide** which possibility you would like to test.
   - Based on the research and observations made previously, formulate a **hypothesis** about the herbal remedy.  
   (This will be the “Hypothesis” section of your written experiment.)
   - **Create** a clear, concise **title** for your experiment.
   - **Write out** a statement of purpose that describes what you intend to try and prove.  
   (This will be the “Purpose” section of your written experiment.)

4. Experiment:
   - **Design** a double-blind experiment. This is an experiment in which neither the test subjects nor those dispensing the remedy know what materials they are dispensing or receiving.
   - **Write** the step-by-step directions, noting each step’s purpose.  
   (This information will form the “Procedures” section of your written experiment.)

(continued)

• Consider the following:
  – Besides being affected by the remedy, how else might your subjects get well?
  – Based on these answers, what variables should be controlled?
  – How will you control these variables?
  – Can the people being tested affect the outcome?
  – How else might your observations of the test show a bias?
  – Whom will you test?
  – Will you have more than one group? Why or why not?
  – How will you control for bias on the part of those taking the remedy?
  – Who will perform the test?
  – How will you control for bias on the part of those dispensing the remedy?
  – In what form (salve, extracts, teas, tinctures, tablets, etc.) will the remedy be dispensed, and why?
  – When will you dispense the remedy, and why?
  – Where will the test be held?
  – What materials will you need? (This will form the “Materials” section of your written experiment.)