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SLEEP AND MEMORY

1. Uwagi ogólne

Zestaw materiałów opatrzony wspólnym tytułem *Sleep and memory* jest adresowany do studentów uzupełniających studiów magisterskich lub jednolitych studiów magisterskich studiujących kierunki humanistyczne. Ze względu na swoją tematykę przedstawione ćwiczenia mogą być wykorzystane przede wszystkim do pracy z grupami studentów psychologii, ale też biologii i biochemii.

2. Poziom zaawansowania: B2+ oraz C1 i C1+

3. Czas trwania opisanych ćwiczeń

Ćwiczenia zaprezentowane w tym artykule są przeznaczone na 2 jednostki lekcyjne (180 minut (cykl 2 zajęć – zadania od 1–8 i 9–15). Czas trwania został ustalony na podstawie doświadczenia wynikającego z pracy nad poniższymi ćwiczeniami w grupach na poziomie B2+ i (słabsze) C1.

4. Cele dydaktyczne

W swoim założeniu artykuł ma rozwijać podstawowe umiejętności językowe, takie jak mówienie, słuchanie, czytanie oraz pisanie.

5. Uwagi i sugestie

W zbiorze przewidziane są ćwiczenia na interakcję student–nauczyciel, student–student oraz na pracę indywidualną. Ćwiczenia mogą być odpowiednio zmodyfikowane w zależności od poziomu grupy, kierunku oraz stopnia zaangażowania studentów w zajęcia. Zadania tu zamieszczone możemy omawiać na zajęciach lub część przedstawionych ćwiczeń zadać jako pracę domową, jeżeli nie chcemy poświęcać na nie zbyt dużo czasu na zajęciach.

Materiały obejmują pytania, informacje, artykuły i zadania dotyczące procesów zachodzących podczas snu. Rozpoczynamy od dyskusji na temat zwyczajów studentów związanych ze spaniem i nauką przed egzaminami (wielu z nich uczy się wtedy w nocy poprzedzającej egzamin z bardzo różnym skutkiem), a następnie przechodzimy do filmiku z TED-Ed na temat związku snu z utrwalaniem pamięci (przechodzeniem informacji z pamięci krótkotrwałej do długotrwałej) (zadania 1–4). Kolejne zadania (5–8) są oparte na kolejnym nagraniu; studenci uczą się identyfikować fazy snu i to, co podczas nich się dzieje. Następna część lekcji (zadania 9–12) jest również poświęcona zadaniom na rozumienie ze słuchu na podstawie kolejnego filmik z zasobów TED-Ed, który traktuje o wpływie braku snu na mózg i ciało. W dalszej kolejności studenci opracowują zestaw porad dla osób cierpiących na bezsenność, rozmawiają o swojej higienie snu, a następnie wykonują zadanie na słownictwo przygotowujące ich do zapoznania się z tekstem na temat pewnej metody radzenia sobie z bezsennością. Po przeczytaniu artykułu studenci dyskutują na temat skuteczności metody oraz wymieniają się wiedzą na temat innych metod, które wypróbowali bądź o których mogli słyszeć.

SLEEP AND MEMORY

"Sweet dreams are made of this" – Annie Lennox

1. In pairs/groups of three, answer the questions below:

A) How many hours a night do you sleep? Is that too little for you or enough?
B) What time do you go to bed? Do you fall asleep immediately or do you sometimes have trouble falling asleep and toss and turn for some time? Why?
C) Do you have a tendency to cram information on the night before an exam? How much do you remember during the exam and after you have finished?

2. Watch a TED-Ed video on sleep (0:00–2:04) and fill in the gaps with 1–3 words.

The video: https://www.youtube.com/watch?v=gedoSfZvBgE [accessed: 15 May 2020].

It's 4 am and the big test is in 8 hours, followed by a piano recital. You've been studying and playing for days, but you still don't feel ready for 1) ……. So, what can you do? Well, you can drink another cup of coffee and spend the next few hours cramming and practising but, believe it or not, you might be better off closing the books, putting away the music and going to sleep. Sleep 2) ……. nearly a third of our lives, but many of us give surprisingly little attention and care to it. This 3) ……. is often the result of a major misunderstanding. Sleep isn't lost time or just a way to rest when all our important work is done. Instead, it's a critical function during which your body balances and regulates its 4) ……. systems, affecting respiration and regulating everything from circulation to growth and immune response. That's great, but you can worry about all those things after this test, right? Well, not so fast. It turns out that sleep is also 5) ……. for your brain, with the fifth of your body's circulatory blood being channelled to it as you 6) ……. And what goes on in your brain while you sleep is an intensely active period of restructuring that's crucial for how our memory works. 7) …….. our ability to remember things

doesn't seem very impressive at all. 19th-century psychologist Herman Ebbinghaus demonstrated that we normally forget 40% of new material within the first 20 minutes, a phenomenon known as the 8) ..... . But this loss can be prevented through memory consolidation, the process by which information is moved from our 9) ..... short-term memory to our more durable long-term memory. This consolidation occurs with the help of a major part of the brain, known as the 10) ..... .

3. In pairs/groups of three, discuss which of the statements below are true:

A) The hippocampus is a small organ located in the brain's medial temporal lobe and is an important part of the limbic system, the region that regulates emotions.
B) Apart from being important to the formation of long-term memory, the hippocampus also plays an important role in spatial navigation.
C) In Alzheimer's disease, the hippocampus is one of the first regions of the brain to be affected.
D) All of the above.

4. Continue watching the video (2:04–2:51) and answer the questions below:

A) What was the problem of the patient known as H.M.?
. . . . . .
B) What was he still able to do?
. . . . . .
C) What is declarative memory?
. . . . . .
D) What about procedural memory?
. . . . . .

5. True or false? Watch another part (2:51–3:51) and decide if the statements are true or false.

A) First, sensory data is transcribed and recorded for some time in the neurons as short-term memory T/F
B) Sensory data is later moved to the hippocampus, which weakens the neurons in that area T/F
C) Neuroplasticity makes it possible for new synaptic buds to be formed T/F
D) Because of the hippocampus' connection with emotions, memories made in times of stress or intense emotions are better recorded T/F
E) Memory consolidation depends, to a large extent, on decent sleep T/F

6. In pairs/groups of three, discuss:

A) What sleep cycles can you identify?
B) Do you know why we sometimes feel we're falling in the initial stages of our sleep?
C) What happens in the REM stage?

7. Watch a video about sleep stages (0:00–2:40) and answer the questions below.

The video: https://www.youtube.com/watch?v=kaoMD1XI5u8 [accessed: 15 May 2020].

A) What is different when we fall asleep and when we are awake?
. . . . . .
B) What does the first stage consist of?
. . . . . .
C) What can you experience at this stage?
. . . . . .
D) What are K-complexes, which appear in the second stage?
. . . . . .
E) What happens with heart rate, respiratory rate and brain activity in stages 3 and 4?
. . . . . .
F) What was Michael Juve's discovery?
. . . . . .
G) What happens during REM?
. . . . . .

8. Continue watching the video (2:40–4:03) and fill in the text with 1–2 words.

The sleep timeline 1) ..... stages one through four in order, however, after about an hour into your sleep, you begin to cycle back from stages four through stages three, two and then REM.
When it comes to dreaming, REM dreams are known to contain 2) .... and complicated plots. Do not confuse REM and dreams – they are not the same thing, although they do 3) .....
REM sleep consists of a high density of PGO waves. PGO stands for pons geniculate 4) ..... As the name suggests, the waves begin in the pons, then show up in the lateral geniculate and, finally, the occipital 5) .....
PGO is a pattern of high amplitude electrical potentials. Each PGO wave is synchronized with an eye movement in REM.
Different people need different amounts of sleep and the benefits not only improve your mood and 6) ..... those under-eye circles, but also

contribute to a healthier lifestyle. A good night's sleep can improve memory, your 7) ……, sharpen your attention and more, so remember to get a good night's sleep at the end of the day because if you don't, you'll die! Probably not, but it's healthier…

9. In pairs/groups of three, discuss:

A) What do you think would happen if you couldn't sleep for a few days? What would happen after, e.g., 48 hours?
B) What was the longest time you have gone without sleep? How did you feel? Why couldn't you sleep?

10. Here's a TED-Ed video on the effects of sleep deprivation on the human body. Watch the video (0:00–2:47) and answer the questions.

The video: https://www.youtube.com/watch?v=dqONk48l5vY [accessed: 15 May 2020].

A) What happened during the experiment?
Day 2: . . . . . .
Next: . . . . . .
At the end of the experiment: . . . . . .
. . . . . .
B) What health problems can lack of sleep cause?
. . . . . .
C) How much sleep do grown-ups and teenagers need a night?
. . . . . .
D) What sleep-inducing chemicals help us doze off?
. . . . . .
E) What happens during the non-REM sleep?
. . . . . .
F) How many teens and adults in the US are sleep-deprived on a regular basis?
. . . . . .
G) What kind of problems does sleep deprivation cause?
. . . . . .
. . . . . .
H) Those who sleep for 6 hours a night are …… times more likely to have a stroke than those who get 7–8 of sleep.

11. In pairs/groups of three, discuss:

A) Are you surprised by any information from the video?
B) Have you ever been sleep-deprived? How do/did you cope with sleep deprivation?

12. Continue watching the video (2:47–4:19) and complete the text with 1–2 words.

How can sleep deprivation cause such immense suffering? Scientists think the answer lies with the 1) ..... of waste products in the brain. During our waking hours, our cells are busy using up our day's energy sources, which get broken down into 2) ....., including adenosine. As adenosine builds up, it increases the 3) ..... to sleep, also known as sleep pressure. In fact, caffeine works by blocking adenosine's 4) ..... . Other waste products also build up in the brain and if they're not 5) ....., they collectively overload the brain and are thought to lead to the many negative symptoms of sleep deprivation. So, what's happening in our brain when we sleep to prevent this? Scientists found something called the 6) ....., a clean-up mechanism that removes this buildup and is much more active when we're asleep. It works by using 7) ..... to flush away toxic byproducts that accumulate between cells. 8) ....., which serve as pathways for immune cells, have recently been discovered in the brain and they may also play a role in clearing out the brain's daily waste products.
While scientists continue exploring the restorative mechanisms behind sleep, we can be sure that slipping into 9) ..... is a necessity if we want to maintain our health and our 10) ..... .

13. In pairs/groups of three, discuss the questions below.

A) How much time before going to bed do you put away all your electronic devices? Is there a TV in your bedroom?
B) Do you use any apps which block blue light in your devices?
C) Is your bedroom dark or full of light?
D) How many pillows do you have on your bed?
E) Is there anything you won't sleep without?

14. In pairs/groups of three, try to complete pieces of advice on how to have a good night's sleep:

According to leading sleep researchers, there are techniques to combat common sleep problems:

- Don't drink ..... to ..... hours before bed and minimize daytime use.
- Don't smoke, especially just before .....
- Avoid ..... and .....meals before sleep.
- Get regular ..... .

- Minimize ....., ... and ..... and ..... temperatures where you sleep.
- Go ..... at the same time each night.
- Try to wake up without ..... .
- Attempt to go to bed a little ..... every night for certain period; this will ensure that you're getting enough sleep.

Adapted from: http://www.apa.org/topics/sleep/why.aspx [accessed: 15 May 2020].

15. In pairs/groups of three discuss any other techniques which could help to get a good night's sleep.

KEY

2.
1) either 2) occupies 3) neglect 4) vital 5) crucial 6) drift off 7) At first glance 8) forgetting curve 9) fleeting 10) hippocampus.

3.
d) All of the above.

4.
A) His hippocampus had been removed, making it impossible for him to form both new short-term and long-term memories.
B) He was still able to learn physical tasks through repetition.
C) Facts and concepts.
D) E.g., the finger movement you need for a recital.

5.
A) T/F – Sensory data is initially transcribed and temporarily recorded in the neurons as short-term memory.
B) T/F – From there, it travels to the hippocampus, which strengthens and enhances the neurons in that cortical area.
C) T/F – Thanks to the phenomenon of neuroplasticity, new synaptic buds are formed
D) T/F – … memories that are formed in times of heightened feeling, or even stress, will be better recorded due to the hippocampus' link with emotion.
E) T/F – … one of the major factors contributing to memory consolidation is, you guessed it, a good night's sleep.

6. (Nie ma potrzeby objaśniania studentom wszystkich odpowiedzi, ale można uzupełnić ich wiedzę po ćwiczeniu 7, które częściowo odpowiada na pytania z ćwiczenia 6).

A) Usually sleepers pass through four stages: 1, 2, 3, and REM (rapid eye movement) sleep. These stages progress cyclically from 1 through REM then begin again with stage 1. A complete sleep cycle takes an average of 90 to 110 minutes, with each stage lasting between 5 to 15 minutes. The first sleep cycles each night have relatively short REM sleeps and long periods of deep sleep but later in the night, REM periods lengthen and deep sleep time decreases.

B) The experience of the transitional state from wakefulness to sleep: the *hypnagogic* state of consciousness, during the onset of sleep (for the transitional state from sleep to wakefulness see hypnopompic). Mental phenomena that may occur during this "threshold consciousness" phase include hallucinations, lucid thought, lucid dreaming, and sleep paralysis. The latter two phenomena are themselves separate sleep conditions that are sometimes experienced during the hypnagogic state [1].

C) Your eyes move rapidly from side to side behind closed eyelids. Mixed frequency brain wave activity becomes closer to that seen in wakefulness. Your breathing becomes faster and irregular, and your heart rate and blood pressure increase to near waking levels. Most of your dreaming occurs during REM sleep, although some can also occur in non-REM sleep. Your arm and leg muscles become temporarily paralyzed, which prevents you from acting out your dreams. As you age, you sleep less of your time in REM sleep. Memory consolidation most likely requires both non-REM and REM sleep.

7.

A) *Our heart rate and brain activity.*
B) *It consists of alpha waves characteristic of relaxation.*
C) *Hypnogogic sensations – the sensation of falling, when your body jerks.*
D) *These are waves which occur when we react to, e.g., sounds in the bedroom.*
E) *They significantly decrease.*
F) *He coined the term paradoxical sleep – in some ways, it is deep sleep, and in others, light sleep. It is also known as REM (Rapid Eye Movements).*
G) *Heart rate, breathing rate and brain activity are more variable than during stages 2–4, facial twitches and eye movements appear.*

8.

1) consists of 2) striking imagery 3) overlap 4) occipital 5) cortex 6) banish 7) lifespan

10.

A) Day 2: His eyes stopped focusing and he lost the ability to identify objects by touch.
Next: He was moody and uncoordinated.
At the end of the experiment (4 symptoms): he was struggling to concentrate, had trouble with short-term memory, became paranoid and started hallucinating.
B) It can cause hormonal imbalance, illness, and, in extreme cases, death.
C) Adults need 7–8 hours and adolescents need about 10.
D) They are adenosine and melatonin.
E) Our DNA is repaired and out bodies replenish themselves for the day ahead.
F) 30% of adults and 66% of adolescents.
G) Learning, memory, mood and reaction time are affected. Also, sleeplessness may cause inflammation, hallucinations, high blood pressure and it has even been linked to diabetes and obesity.
H) 4.5

12.

1) accumulation 2) various by-products 3) urge 4) receptor pathways 5) cleared away 6) glymphatic system 7) cerebrospinal fluid 8) Lymphatic vessels 9) slumber 10) sanity

14.

- caffeine four … six
- bedtime
- alcohol and heavy meals
- exercise
- noise, light, hot and cold
- to bed
- an alarm clock
- earlier

Pytania 1, 9, 11, 13 i 15 nie wymagają klucza.