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Learning Unit for 10th Grade
on

The Plastic Brain of the Adolescent

Unit Developers:
Yael Gelbard and Dr. Limor Moreh
Hannah Senesh City High School



General information

Developers: Yael Gelbard and Dr. Limor Moreh

Date of Development: April 2023

Field of knowledge: Health Sciences and Psychology

Age group: Grade 10

Estimated time for learning: 10 hours of study (5 double lessons, each of 45 minutes, weekly)

Subject studied: The Plastic Brain of the Adolescent.

Sub-theme: The brain changes during adolescence and their effect on "body-mind", the developmental processes and changes in personality during adolescence

Key concepts: The nervous system, the plasticity of the brain, hormones, the peer group, moratorium, personality components, stages of personality development

Learning environment: Classrooms, computerized environment, class discussions, round tables, product stage.

Teaching aids: Accompanying presentation according to the order of the lessons (separately attached)



Reasons for choice of subject

Rationale for the teacher and the learning sequence

The subject of the unit is understanding the structural changes that occur in the brain during adolescence which influence behavior at this age. The purpose of the unit is to get to know the mental complexity of adolescents and the changes in their behavior during puberty due to changes in the structure of the brain.

The existing curriculum does not emphasize the direct effect of the changes the brain undergoes during puberty on an adolescent's character and behavior, because it teaches science, more or less separately, from psychology - the body is distinct from the mind and separated from it; For many years, academia dealt with the separation between biology and psychology between the body and the mind. Only in recent years have we witnessed many studies that emphasize the synergy between the two and the inseparable connection between what happens in the body and what happens in the mind.

The purpose of this unit is to stimulate curiosity and dialogue among the students themselves and between them and their parents, with the understanding that the changes that occur in the brain and which affect both the body and behavior can be harnessed, with proper guidance, for the benefit of the student's development to shape him/her into an independent and responsible adult.

The unit will be taught in collaboration with the health sciences teacher and the psychology teacher.

General goals:

- The students will get to know the basic structure of the nervous system and the brain and understand the complexity of the changes that affect their bodies and minds during adolescence.
- The students will practice and apply different skills of research and application, interpersonal and intrapersonal skills in this unit.



How is the E (Education) principle expressed in the teaching unit?

The students will acquire basic knowledge and tools for understanding the changes that occur in the adolescent's mind and from these, they will be able to understand the complexity involved in puberty, which, although it is physical, affects adolescents' behavior and the way they conduct themselves, both in ways of thinking and in visible behavior. In light of this, and in order to cultivate value and critical thinking, the students will outline ways for their future behavior. The students will get to know the elements of their personality and development that are affected by heredity and the environment, as well as the neurological-brain effect and their behavior because of this.

The main value in the unit is that of choice: the understanding that the choices of each student - in this period of life - will affect his/her life and contribute to shaping him/her as an adult; In harmony, the unit's teaching and learning processes allow for choice both in the study and research contents and in the products.

The teaching and learning processes will encourage and develop interpersonal skills such as: teamwork, respect for others and awareness of one's surroundings; Intrapersonal skills of self-examination such as: self-esteem, self-image, independence, reflective skills; All of these will help the female and male students to delve deeper into the processes that their body and soul go through and which help to establish morals and values for themselves. For example: analyzing the issue of risky behavior such as smoking drugs witnessed by other students, presenting it and looking for ways to conduct it: reporting at the cost of whistleblowing, conformism versus non-conformism. These concepts are very important in adolescence since the peer group is the center of the adolescent's world and free choice and principles may be overwhelming for a teenager.



How is the A (Academy) principle expressed in the teaching unit?

The teaching and learning processes will include and integrate the fields of medicine and psychology. The learning method of the unit will expose the students to research questions and to encourage depth of understanding through reading and analyzing studies. Also, the students will locate relevant and reliable sources of information, read articles and answer questions, process the material and draw conclusions. Gradually, the students will be exposed to different sources that characterize adolescence, help them to understand their meaning and form an opinion about them. During the lessons, values such as: identity, taking responsibility, human dignity, tolerance and acceptance of the other, family, involvement, justice and integrity will be discussed.

Examples of possible learning outcomes:

- Lesson planning
- Types of research
- Use of digital tools: podcasts, videos, posters, presentations
- Building a model

At the end of the teaching unit, the students will present products prepared and designed according to the topic. The type of product will be chosen by the students according to their skills and inclination.



How is the C (Community) principle expressed in the teaching unit?

The connection to the community will be manifested in the students' teamwork and the acquisition of cooperative skills, as well as an inclusive and respectful discourse. The students will discuss the contents studied, overcome difficulties and formulate ways of dealing with the peer group in their class. In addition, the students will conduct a dialogue with their parents and teachers and seek appropriate and professional assistance if necessary. During the study of the unit and at the end, the students will present the "toolbox" that they have acquired in the various media in the circles around them. To conclude, the students will hold an evening presenting their products on the topic of adolescence to which the teachers of the unit and the parents of the students will be invited. The evening will include a discussion on puberty and will present the insights learned during the lessons by both the students and the guiding team. Later, the students will participate in "round tables" together with their parents and the teachers, in order to develop an open dialogue about the different experiences of the adolescent, different perspectives on puberty and ways of coping.

How is the H (Hi-tech) principle expressed in the teaching unit?

During the study unit, students will develop and practice up-to-date study and thinking skills relevant to our time such as: asking questions, identifying and solving dilemmas and problems, self and group learning, critical thinking, setting goals, sticking to a schedule, standing in front of an audience, reflection, innovation and creativity. The students will research the study topics independently and in groups using diverse tools. At the end of the process, the students will develop products in various up-to-date digital spaces and present them to the community in a meeting that they will plan and organize.



Learning Resources

Prior knowledge

- In health sciences: basic knowledge about the human body acquired in middle school.
- In psychology: no previous theoretical knowledge is necessary.

Learning and reference materials:

Accompanying presentation: the plastic brain of the adolescent (attached to the website)

- • Online databases, journals and books
- • Age-appropriate scientific articles
- • Videos and podcasts



Lesson program/ study sessions

Introduction: knowledge base

- Lesson 1: Adolescence - "Get over it, what's with you?"
- Lesson 2: Getting to know the brain and the nervous system - structure and activity
- Lesson 3: The plasticity of the brain and the human soul
- Lesson 4: The adolescent's plastic brain and its effect on behavior
- Lesson 5: To conclude the unit: Guidance for the product stage and a guest lecture

A companion presentation is attached to the unit according to the order of study sessions.



Program for Lesson 1

Adolescence: "Get over it, what's with you?"					
Time	each model principle	Terms	Activities		Teaching Course
			Recommendations to the teacher	Instructions to students	
20 minutes	Academy: encouraging curiosity, relevance to students' lives, analyzing visual and auditory sources of information Integrative teaching and learning processes.	Puberty Changes: body, mind	Slides 2 – 5 of the presentation	The students will listen to Arik Einstein's song " Get over it, what's with you? " The students will discuss in class "My Teenage Years". The students will be exposed to the topic of the unit: My adolescence.	Introduction
50 minutes	Skills: discourse management, critical thinking, identification and internalization of self-worth	Stages of development in adolescence	Consider heredity vis-à-vis the environment Open discourse and discussion must be allowed and encouraged.	The students will watch the short film about adolescence: " Sorry for asking " The students will discuss their perception of puberty. Students will share associations from their world on the subject of puberty.	Practice, implementation and evaluation
20 minutes	Skills: development of reflective ability, self-awareness, participation, involvement		Present the teaching method of the unit: teamwork, punctuality, the connection to the values of the school .		Summary and reflection

Program for Lesson 2

Introduction to the brain and nervous system

Time	each model principle	Terms	Activities		Teaching Course
			Recommendations to the teacher	Instructions to students	
10 minutes	Academy: Conceptualization in the field of knowledge, research, asking questions, higher order thinking, drawing conclusions, analyzing diverse sources of information, reading texts Skills: teamwork, oral expression, information transfer, creativity, reflectiveness	Brain, consciousness, awareness, stimuli	(Slides 6-26 in the accompanying presentation) Understanding behavior as a result of neurological changes should be emphasized.	The students will discuss "What is a brain?"	Introduction
60 minutes	Academy: Conceptualization in the field of knowledge, research, asking questions, higher order thinking, drawing conclusions, analyzing diverse sources of information, reading texts Skills: teamwork, oral expression, information transfer, creativity, reflectiveness	Central nervous system: neuron, synapse, white matter, gray matter, electrical stimulation, chemical stimulation, electrical network	Part one: Students will learn about the nervous system and the brain. Students will watch a video on the nervous system , and afterwards, the students will discuss the connection between the structure of the brain and its functions. The students will learn about the structure of the nerve cell (neuron) and build a model of a nerve cell. Part two: The students learn about the autonomic nervous system, stress factors in adolescence, the fight/flight model, introduction to various studies in the field. The students will watch the video " Stress " and then discuss the ways of dealing with stress in adolescence.		Practice, implementation and evaluation
20 minutes	Skills: creativity, self-expression, development of reflective ability, punctuality	The autonomic nervous system: Its effect on the body, diseases, catastrophic thoughts	Creativity must be emphasized as a tool for personal expression and as a mirror for body and soul.	The students will present the products and summarize the learning experience. The students will reflectively analyze the learning: <ul style="list-style-type: none"> • Did building the models help me in understanding the studied material? • Would I have preferred to learn in a different way? • Did I keep to the schedule? 	Summary and reflection



Program for Lesson 3

The plasticity of the human brain and soul

Time	each model principle	Terms	Activities		Teaching Course
			Recommendations to the teacher	Instructions to students	
15 minutes	Academy: Conceptualization in the fields of knowledge, higher order thinking, asking questions, investigating diverse sources of information to provide an information base	My mind is who I am. Development, learning, growth, maturing, full development	Slides 27 – 47 of the presentation	Students will watch the film הפלסטיות של המוח They will analyze and learn what a plastic brain is? The students will discuss in class: What are the advantages of a plastic brain? What allows the brain to be plastic?	Introduction
60 minutes	Community: The parents' community is an integral part of the learning process through questionnaires Skills: learning in groups, formulating questions, research	Brain changes in structure and function during life, neural pathways, brain wiring, learning processes, the developing mind and related behavior: Who am I and what am I in the world? My environment, genes, inner world of values – identity/ personal soul.		The students will watch the short film איך המוח שלכם עובד Following the video, the students will learn what developmental psychology is: studies on the subject, the stages of development (Freud and Erikson) The students will research the topic in small groups by finding and reading articles and research studies. The students will write a questionnaire for their parents about their adolescence.	Practice, implementation and evaluation
15 minutes	Skills: listening, reflective ability	Body/soul	Emphasize the interdisciplinary teaching and learning processes	The students will summarize what they have learned under the teacher's guidance	Summary and reflection



Program for Lesson 4

The adolescent's plastic brain and its influence on behavior					
Time	each model principle	Terms	Activities		Teaching Course
			Recommendations to the teacher	Instructions to students	
10 minutes	Academy: Conceptualization in the fields of knowledge, asking questions	White matter, gray matter, synaptic pruning, hormones and risky behavior Sigmund Freud - the structural model: id, ego, superego, pleasure principle, reality principle, moral principle	(Slides 48-74 in the accompanying presentation) The subject of the lesson should be linked to the subjects of the previous lessons.	The students will learn about the changes that occur in the adolescent's mind and why they lead to changes in his behavior. The students will learn what the components of human personality are - What is a persona? What is nature? Sigmund Freud's structural model	Introduction
60 minutes	Academy: conceptualizations in the fields of knowledge, higher order thinking, multidisciplinary research processes, information processing, theoretical reading strategies Values: ways of distinguishing between good and bad, subjective and objective	The relationship between child and parent Restraint and control	Students should be guided in strategies for an effective reading of an article.	The students will read and learn in groups: <ul style="list-style-type: none"> an article discussing the changes that occur in the adolescent brain. an article discussing the effectiveness of physical activity in brain rehabilitation. 	Practice, implementation and evaluation
20 minutes	Skills: expressing an opinion, listening, reflective observation	Me, personality, choices, identification	(Slides 72-71 in the companion presentation) The students should be guided to refer to their insights during the study, their feelings and the main message they internalized.	The students will conclude the unit by choosing a sentence from a collection of sentences dealing with adolescence and refer to it	Summary and reflection



Program for Lesson 5

To conclude the unit: Guidance for the products stage and a guest lecture					
Time	each model principle	Terms	Activities		Teaching Course
			Recommendations to the teacher	Instructions to students	
5 minutes	Academy: Research Innovation and entrepreneurship: a variety of platforms and digital tools for product development Community: a product in preparation for its presentation in the school community and for families		Students should be offered a variety of options for presenting their products: a presentation, a podcast, a poster, a mini-research etc. (Slide 74 in the accompanying presentation)	The students will be guided towards the final product which will summarize the topics of the unit and will be presented on stage.	Introduction
65 minutes	Skills: developing critical thinking, summarizing writing, listening, independent work	Rewiring the brain, attention, concentration training	The workshop presenter Ms. Sigla Goldfarb should be introduced to the students.	The students will participate in a guest workshop: the BAVX treatment method that combines activation of the brain to create new wiring and increase attention, concentration and reduce tensions. The students will draw conclusions and lessons during the workshop and express their opinion during and after it.	Practice, implementation and evaluation
10 minutes	Initiative and community: planning and organizing a product stage evening. Skills: punctuality, planning and organization, cooperation, teamwork, decision making		The product stage event must be planned: - Creating an invitation to an evening dedicated to students and their parents - Organization of "round tables" where students, parents and teachers would sit and talk about the content they learned in the unit (Slide 78 in the accompanying presentation)	The students will be guided towards the products stage of the unit.	Summary and reflection