

B. Making the language used in teaching STEM subjects in secondary school accessible to remigrant students - Educational Resource created by Dana-Zoe Mateescu

Context

Since 2008, more and more Romanians who have gone to work abroad have decided to return to the country, for various reasons, without taking into account the impact that this decision will have on their children. However, for thousands of children, adapting to the domestic system has proven to be very difficult, according to the study "Remigration of Romanian children", conducted by the Social Alternative Association of Iași, in 2012. International research institutions were involved in the study and was supported by the Ministry of Education and the Ministry of Foreign Affairs.

The processed data showed that over 21,000 Romanian children returned to the country from Italy and Spain between 2008 and 2012 and requested the equivalence of their studies for re-enrollment in the Romanian educational system. According to the study, 30% of them had problems with readjustment and social integration: emotional, behavioral, attention or relational difficulties.

Annually, more than half of the total number of children returning to the country is added to the list of those who require specialized intervention from psychological, social and school assistance services, because they have difficulties in rehabilitation.

The statistical situation presented by the Cluj County School Inspectorate underlines the extent of the phenomenon of remigration at the county level.

Thus, in the 2023-2024 school year, 306 applications for equivalence of studies were registered at the Cluj County School Inspectorate for students who returned from abroad or who studied in foreign languages, and in the 2022-2023 school year, 321 applications were registered.

"Also, there was a fairly high percentage of students who request the equivalence of studies at the level of the educational unit, either because they do not have study documents, or because they come from an unrecognized or unaccredited or unauthorized form of education," reads a report by the IȘJ Cluj.

Most applications for equivalence of studies are from the Kingdom of Spain – 58 and the United Kingdom of Great Britain and Northern Ireland, respectively 38, according to data centralized by the IȘJ Cluj. They represent 31.37% of the total number of applications for equivalence.

Some of the students returned from abroad easily adapt to the requirements of the Romanian education system, cope with the demands, understand the language and can respond. Others, however, do not speak Romanian, cannot communicate, cannot relate almost at all.

Among the problems faced by adolescents who have remigrated, beyond the problem of communication, are: anger, irritability, insomnia, learning difficulties, anxiety, states of apathy and depression, substance abuse. Problems relating to the family or peer group may also arise. But the most common problem faced by remigrant children is school adaptation.

School adaptation is a complex process, because the school environment involves different areas of interaction and development. On the one hand, we can talk about the students'

adaptation to the school's requirements, from a cognitive point of view, to cope with school tasks, and about socio-emotional adaptation, to integrate into the new group, to adapt to the new rules imposed by the institution and teachers, and of course to earn a place in the class team.

In the case of remigration, the adaptation process is much more complex and cumbersome, because the student must also adapt to the specifics of the education imposed by the country. We can say that a student has adapted when he comes to school with love, when he does not suffer from emotional disorders, when he cultivates harmonious relationships with teachers and colleagues, and when he manages to fulfill school tasks successfully.

The school adaptation of remigrant students depends, to a large extent, on the teachers who welcome them into the school, who help them understand the requirements, who facilitate their integration into the classroom. Sometimes we are willing to deal more with such students, to understand their problems related to communication, and relationships. Other times we feel the challenge that these children generate in the classroom and we interpret the presence of the place as a problem to which we do not have to find solutions.

Identified needs:

- The need to adapt the didactic approach to the reception and understanding capacity of remigrant students;
- The need to simplify the language used in communicating with remigrant students to facilitate understanding
- The need to process written messages in order to increase the degree of understanding and mental processing of them by remigrant students;
- The need to process and remix open educational resources to increase the understanding and learning of these resources by remigrant students;

Objectives:

- Raising teachers' awareness of the problems faced by some of the remigrant children in school adaptation;
- Raising teachers' awareness of the role they play in integrating remigrant students into secondary school classes;
- Knowledge of the Ministry of Education's strategy regarding the integration of remigrant students;
- Developing the ability to communicate in the language specific to STEM education, in a simplified manner, in order to make the message accessible to remigrant students in secondary school;
 - Developing the capacity to capitalize on and promote current approaches in the field of STEM education in a simplified manner, in order to make the message accessible to remigrant secondary school students;
- Developing the capacity to design, implement and evaluate a STEM project in the teaching activity, in a simplified manner, in order to make the message accessible to remigrant students in secondary school;
- Developing the capacity to use digital technology specific to STEM education in a simplified manner, in order to make the message accessible to remigrant secondary school students;

Target groups:

- Teachers who teach mathematics in secondary school classes in which remigrant children are integrated;
- Teachers who teach natural sciences (physics, chemistry, biology) in secondary school classes in which remigrant children are integrated;
- Teachers who teach technological education in secondary school classes where remigrant children are integrated.

Existing proposal**Strategy of the Ministry of Education:**

For remigrant students and children with foreign citizenship who have reached Romanian school following the remigration process of one of their parents, or children born abroad with remigrant parents, the Ministry of Education proposes several directions of action: Organizing free intensive Romanian language courses in schools for those who do not master the language;

- Establishing partnerships with educational institutions in the country of adoption and encouraging students to communicate with former colleagues;
- Psychological counseling of parents, in order for them to adopt an appropriate conduct regarding the provision of support to children, in order to obtain school performance in Romania;
- Adapting the Romanian language curriculum for those who were born in their adopted country and grew up in another linguistic environment;
- Organizing remedial activities with children;
- Capitalizing on the students' school experience in another education system, in the tutoring classes or in the extracurricular classes, in order to increase self-confidence and strengthen the motivation for performance.

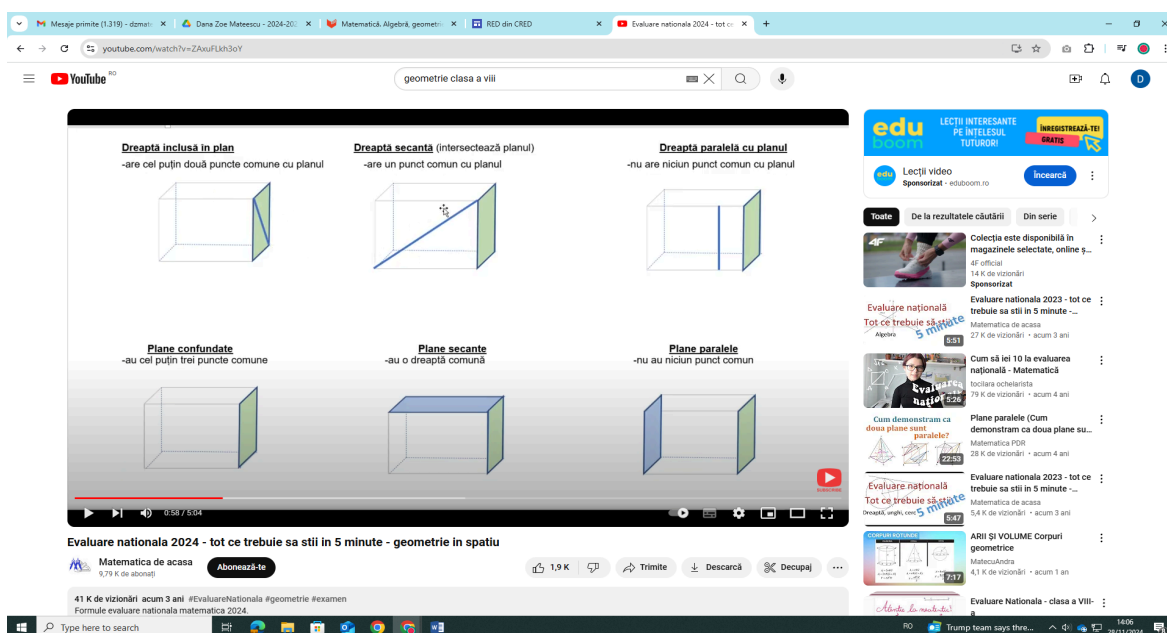
Adaptation processes

We believe that adapting the written text in teaching activities is very important for better conveying the message and for increasing its understanding. We propose four adaptation processes for simplifying the language specific to STEM subjects that can be successfully used by secondary school teachers:

- Making the language specific to STEM education accessible by replacing specific terms with common words;
- Simplification of phraseology in lesson sequences specific to STEM education;
- Use of open educational resources that allow viewing images;
- Use of text translation applications in the language specific to STEM education.

1. Making the language specific to STEM education accessible by replacing specific terms with common words

We propose a model of accessibility of the geometric language, referring to the drawing with geometric figures useful for eighth grade students for the study of the position of a straight line in front of a plane and for the study of the position of two planes. We will use a common, accessible language, familiar to students.



The description of the positions in the drawing in the language proposed by us can be found in the following table:

Position of geometric elements (as shown in the figure)	Description in the drawing	Proposal to amend the text
Right included in the plan	It has at least two points in common with the plan	It is in the plan
Secant Right	There is a common point with the plan	Prick the plan
Straight line parallel to plane	It has nothing in common with the plan	It doesn't sting the plan
Confused plan	Have at least tri points in common	Overlap
Drying plane	They have a common right	Meet
Parallel planes	They have nothing in common	They don't meet

2. Phraseological simplification in lesson sequences specific to STEM education

We propose a phraseological simplification model on a lesson sequence in Biology grade V. the text and the image are taken from the Digital Manual Biology Grade V - Claudia Ciceu, Georgeta Cosma - Booklet Publishing House
Chapter V – Vertebrate Animals – Page 109

Păsările sunt animale vertebrate adaptate la zbor. Corpul lor are formă aerodinamică, este acoperit de pene, puf și fulgi, iar membrele anterioare s-au transformat în aripi. Oasele subțiri, goale în interior, și sacii aerieni sunt de asemenea adaptări pentru deplasarea prin zbor. Au temperatura corpului constantă, sunt homeoterme. Se înmulțesc prin ouă, care sunt clocite de femelă, iar puii sunt îngrijiți de ambii părinți.

cap
aripi
trunchi
picioare
saci aerieni
Alcătuirea corpului la păsări

The proposal to adapt the text is set out in the following paragraph. Writing traits as a list of attributes seems easier to follow.

The birds:
They are vertebrates (they have a backbone)
Fly
Body shape helps them fly (aerodynamics)

3. Use of open educational resources that allow viewing images

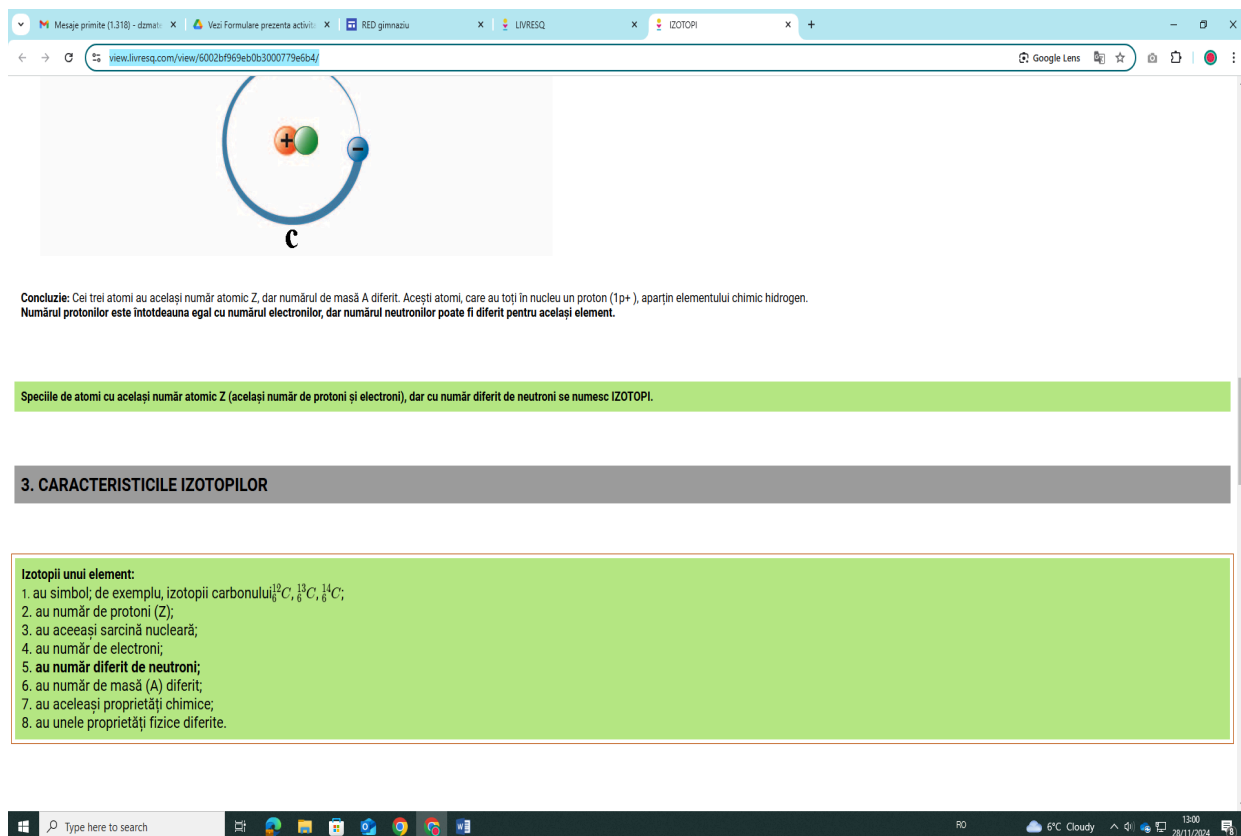
We propose for analysis an open educational resource created by Prof. Angelușiu Mădălina, Chemistry, Grade VII, within the CRED project, accessible on the livresq platform

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<https://library.livresq.com/details/6002bf969eb0b3000779e6b4>

Title of the IZOTOPI lesson

The open educational resource presents the definition and characteristics of isotopes, in a specific language, as can be seen from the sequence presented below:



Concluzie: Cei trei atomi au același număr atomic Z, dar numărul de masă A diferit. Acești atomi, care au toți în nucleu un proton ($1p^+$), aparțin elementului chimic hidrogen. Numărul protonilor este întotdeauna egal cu numărul electronilor, dar numărul neutronilor poate fi diferit pentru același element.

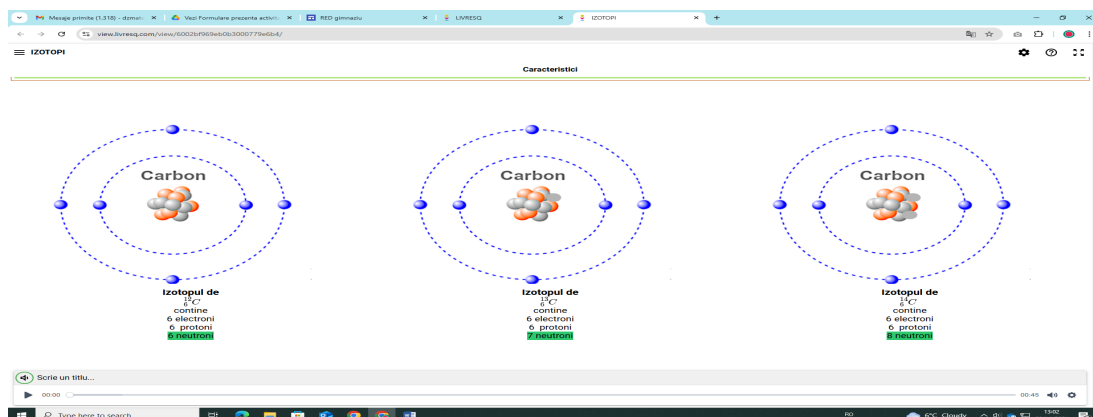
Speciile de atomi cu același număr atomic Z (același număr de protoni și electroni), dar cu număr diferit de neutroni se numesc IZOTOPI.

3. CARACTERISTICILE IZOTOPILOR

Izotopii unui element:

1. au simbol; de exemplu, izotopii carbonului $^{12}_6C$, $^{13}_6C$, $^{14}_6C$;
2. au număr de protoni (Z);
3. au aceeași sarcină nucleară;
4. au număr de electroni;
5. au număr diferit de neutroni;
6. au număr de masă (A) diferit;
7. au aceeași proprietăți chimice;
8. au unele proprietăți fizice diferite.

In order to understand the characteristics of isotopes, the open educational resource presents images of the atomic structure of three isotopes, as seen in the following image:



Carbon

Izotopul de $^{12}_6C$ conține 6 electroni și 6 protoni.

Carbon

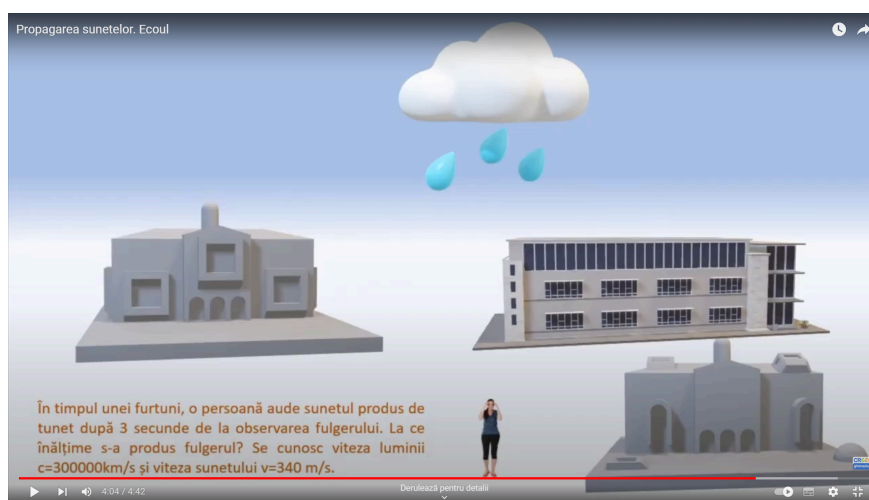
Izotopul de $^{13}_6C$ conține 6 electroni și 7 protoni.

Carbon

Izotopul de $^{14}_6C$ conține 6 electroni și 8 protoni.

4. Use of text translation applications in the language specific to STEM education

We will apply as an example the translation of a text, a physics problem proposed for solving, from the open educational resource created within the CRED project
Propagation of sounds. Ecoul – Expert in RED Physics development – professor Sorin Gabriel Păunescu <https://www.youtube.com/watch?v=Mwt01WtzxD0>
The text of the problem is contained in the following image:



During a thunderstorm, a person hears the sound produced by thunder 3 seconds after observing lightning. At what height did the lightning strike? The speed of light $c=300000\text{km/s}$ and the speed of sound $v=340\text{m/s}$ are known

Translation into French:

Lors d'un orage, une personne entend le bruit du tonnerre 3 secondes après avoir vu l'éclair. A quelle hauteur la foudre a-t-elle frappé ? On connaît la vitesse de la lumière $c=300000\text{km/s}$ et la vitesse du son $v=340\text{m/s}$

Translation into Italian:

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Durante un temporale una persona sente il rumore del tuono 3 secondi dopo aver visto il fulmine. A che altezza è caduto il fulmine? Conosciamo la velocità della luce $c=300000 \text{ km/s}$ e la velocità del suono $v=340 \text{ m/s}$

Translation into Spanish:

Durante una tormenta, una persona escucha el sonido de un trueno 3 segundos después de ver el relámpago. ¿A qué altura cayó el rayo? Sabemos la velocidad de la luz $c=300000 \text{ km/s}$ y la velocidad del sonido $v=340 \text{ m/s}$

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