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**THE INTEGRATION OF CONCEPT MAPS IN THE TEACHING ACTIVITY.
SWOT ANALYSIS OF THE APPLICATIONS EXISTING ONLINE DEDICATED TO
THE ELABORATION OF CONCEPT MAPS**

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Abstract: *The concept maps (cognitive maps; mind mapping) can be defined as mirrors of the thinking, feeling and understanding manner of the one(s) approaching them. They can therefore be used in learning concepts (leading to facilitating the representation of the learning process) and in assessing the knowledge.*

Their current use in the teaching activity opens new perspectives to an active and conscious learning process to the detriment of the one based exclusively on memorisation and reproduction.

Attracting students to use such concept maps for fixing, clarifying and assessing the knowledge is challenging for the teaching staff in the technical education system, and not only. Thus, attracting the students leads to a good clarification of the concepts they acquired giving them, at the same time, through these resources, the possibility to verify, strengthen and clarify their knowledge.

This paper sets out the SWOT analyses of the applications designed for elaborating concept maps existing on-line (only the ones the authors use, such as Mind Meister, Gliffy, Mind42, Bubbl.us, XMind, Creately, Mindomo, Think Fold, MyWebSpiration, Spinscape, Lucid Charts, Spicy Nodes, Mind Jet Catalyst, Comapping and not ultimately SmartDraw - where create great-looking mind maps, concept maps, flowcharts in minutes), this analysis focusing on the differentiated elements, useful for the teachers and students in the teaching activity. The websites studied and presented in this paper can be used in various fields of activity.

Using this method in the performance assessment leads to conceptualising some programmes for improving, recovering or accelerating the evaluation tests (it practically facilitates the evaluation process).

Keywords: *education, mind mapping, concept maps, cognitive maps, tools*

I. INTRODUCTION

The conceptual maps are the visual manner that the concepts presented in a content interrelate in. They are based on the idea according to which, at the basis of a new piece of knowledge are the already acquired knowledge. The pupils must know the relations established between the various pieces of knowledge so that they may organise the received information.

Recognised nowadays especially as learning tools, rather than evaluation instruments, the conceptual maps evaluate how pupils structure and organise the knowledge.

In the teaching-learning-evaluation process, the conceptual maps are made in a very directed and controlled manner. The teacher imposes key words, relation-making schemes, the pupil having the task to fill in the blank spaces in the map structure.

There is also the possibility to have the conceptual map elaborated completely by the pupils through the independent establishment of relationships between the concepts; this approach is however more difficult to apply to the younger grade pupils.

Advantages

- The use of conceptual maps in learning concepts leads to facilitating learning and strengthening the acquired knowledge
- The already pre-existing knowledge is organised in the trainee's mind and the path for new assimilation is prepared
- Perspectives are opened to an active and conscious learning process to the detriment of the learning based on memorising and reproduction
- The relations made between the trainee's knowledge can be seen.
- The performance evaluation is very much facilitated by this technique because it shows how trainees think and how they use what they have already learned.
- Used in evaluation, (they can be used as evaluation tests and they provide clues to how the acquired notions have been assimilated and connected).

II. SWOT ANALYSIS

In this paper we proposed to deliver a SWOT analysis of the existing websites in the electronic environment (identified by the authors), websites which can be very easily integrated in the teaching activities in the classroom and not only.

BUBBL.US	
Strengths	Weaknesses
<ul style="list-style-type: none"> - it has a free version - it allows the creation of the conceptual maps directly on the website, without creating a user account - it uses Flash - it is operational on numerous platforms - it has low requirements (it does not occupy a lot of space on the HDD and it only requires the use of a web browser) - it allows making different presentations from the usual ones - a very user-friendly programme even for the inexperienced. - work can be started right on the first page by simply clicking a button. - an account can be created where all the started applications can be saved. - nicely spaced page where one can easily see the project completion stage; there is also a zoom in / zoom out button for a quick navigation through the application. - possibility to print the completed project directly from the programme. - share button directly from the programme to any web page. - very simple design <ul style="list-style-type: none"> ❖ intuitive, it connect the bubbles by itself ❖ flexible: the bubble colour, size and position change is immediate, as is the undo function 	<ul style="list-style-type: none"> - the free version allows a maximum of 3 maps - it has no mobile version - obsolete graphical interface - it cannot export files as .pdf - once created and exported, the conceptual map cannot be modified (it is not interactive) - a maybe over-simplistic editing manner for a professional presentation - the programme is addressed mostly to beginners. - no images can be added - it cannot be developed simultaneously by several users - English-based help only - it cannot be used for more complex maps - impossible to use without Internet access
Opportunities	Threats
<ul style="list-style-type: none"> - it allows creating conceptual maps in a short amount of time - it encourages the brainstorming - it can be used by anyone, including by persons who are now learning the concept of the "conceptual map" 	<ul style="list-style-type: none"> - it can be surpassed by applications offering more tools - the project complexity and design suffer.

<ul style="list-style-type: none"> - anyone can create a map by a simple click on the button with no prior training. - very easy to learn. - possibility to easily add the maps on the website (e.g., on the training website) - exporting in a presentation software, such as Microsoft PowerPoint - it is said the image-adding function will be added - it has a good reputation index, over 2,400 - the demand for such programmes is increasing 	<ul style="list-style-type: none"> - decreasing Flash support - the clients are searching for applications working also on mobile devices - the web application market is very dynamic and the competition can develop very rapidly
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MIND 42

Strengths	Weaknesses
<ul style="list-style-type: none"> - easy and intuitive creation; it does not require advanced computer-use skills and knowledge - it uses Flash technology - the conceptual map can only be created online, but it can be presented offline (in the absence of internet connection). - various export possibilities; it needs no installation, but only the creation of a user account. - possibility to collaborate with other users - possibility to load files in the conceptual map such as: audio, video files, images, tasks, emoticon, links (it has direct link to wikipedia.com). 	<ul style="list-style-type: none"> - only available online; it requires logging on - both paying versions (standard and unlimited) are available at exorbitant prices!
Opportunities	Threats
<ul style="list-style-type: none"> - available quickly and easily but only with an internet connection (not necessarily a high speed one) 	<ul style="list-style-type: none"> - the risks specific to the internet navigation and account creation (fishing attacks, creation of unintentional firewall doors in the case of inexperienced users) - decreasing Flash support

MINDOMO

Strengths	Weaknesses
<ul style="list-style-type: none"> - access management and security for the paper - Mindomo accepts hyperlinks, file attachments, integration and video on YouTube. - There are export options. - Easy to use the toolbar. - There is also a free version - It works very fluently and without interruptions in Flash. The animations are designed to help the readers and they are fluid. Since it uses Flash technology, it can only be used on a laptop/PC, and it cannot be used on mobile devices (as it happens for a large part of the corporations nowadays). - Various export possibilities: map, images (jpg, png), Word, Excel, PDF document. 	<ul style="list-style-type: none"> - There are several versions, depending on the payment plan, and having a storage space of 350 MB. - The account can be terminated due to inactivity.
Opportunities	Threats
<ul style="list-style-type: none"> - The users cannot be taken apart from the copyrights. 	<ul style="list-style-type: none"> - The advertisement content can be used by Mindomo at their discretion. - Possibility of being harassed, threatened and intimidated by the other users

MindMeister	
Strengths	Weaknesses
<ul style="list-style-type: none"> - it has a free version - it has a mobile version (Android and iOS) - it uses HTML5, and works on numerous platforms - may functionalities, complex support - it uses shortcut keys - it can be developed in parallel with other users - support for several languages (English, Spanish, German, Portuguese, Russian, Dutch, Japanese) - work can be done very quickly (no delays in loading) both for the onsite application, and for the browser one 	<ul style="list-style-type: none"> - it requires a paid account; the average monthly fee for the programme is 7.5 \$ - the free version allows 3 maps - less intuitive
Opportunities	Threats
<ul style="list-style-type: none"> - offline applications for iPhone - the HTML 5 is very promising - voted as a trusted application amongst the ones of this type (it has a good reputation index of over 5,100) - it is in the Google app store - the demand for this type of application is rising 	<ul style="list-style-type: none"> - the account cost for having access to all the functionalities - the - the web application market is very dynamic and the competition can develop very rapidly
CREATLY	
Strengths	Weaknesses
<ul style="list-style-type: none"> - it provides tutorials for identifying and learning the options offered by the application - website containing support to create a variety of online diagrams, e.g.: conceptual maps, UML diagrams, Venn diagrams, Swot analyses. - 23 types of diagrams - it can be used freely - a very intuitive application, attractive design - it offers several types of subscription plans (user-type choice depending on the price paid) - it offers the possibility to save the documents online by creating an account - it offers templates which can be used by the less experienced users. - possibility of sharing with other users - clear website organisation: menus: characteristic, offered products, price for every products, login - possibility to access diagrams created by other users 	<ul style="list-style-type: none"> - it provides a free version and a paid version, the latter being much more complex - small document uploading speed - very simple design - low range of forms - there is no key word search engine on the site - material accessed under licences - Copyright law - presence of links for websites of the same type: creation of diagrams
Opportunities	Threats
<ul style="list-style-type: none"> - using the application in managing projects - possibility to enlarge the applicability fields - possibility to create an account and receive updates for the attended courses - possibility to develop complex projects within a community - unloading diagrams to be viewed offline: desktop download - possibility to access the website in 7 languages - possibility to post on the website blog 	<ul style="list-style-type: none"> - a main threat is the competition brought by the other applications offering the same possibilities, but better - redirecting the user to other websites when they try to access a link - faster websites, having a more attractive and professional design

CACOM	
Strengths	Weaknesses
<ul style="list-style-type: none"> - attractive design - easy login for the new users - user friendly - several versions of technical support 	<ul style="list-style-type: none"> - too few facilities for the free versions - it has no advanced functions
Opportunities	Threats
<ul style="list-style-type: none"> - the company packages seem very attractive, and they could be improved to attract more clients from this sector - the increase in the number of languages supported by the programme could increase the number of users 	<p>The service is not very popular and faced with giants such as Google it could lose ground. Very numerous applications of this kind have appeared and cacom should bring something extra compared to its competitors</p>
WEBSPIRATIONPRO	
Strengths	Weaknesses
<ul style="list-style-type: none"> - detailed help centre - various support methods - many templates and examples - attractive prices 	<ul style="list-style-type: none"> - heavy design - difficult to navigate through the menu
Opportunities	Threats
<ul style="list-style-type: none"> - personalising the service with tools such as the RapidFire tool will make the software irreplaceable - developing the collaboration methods will increase the product success in the business environment (it already has several types of users) 	<p>The service is not very popular, and faced with giants such as Google it could lose ground</p>
COMAPPING	
Strengths	Weaknesses
<ul style="list-style-type: none"> - immediately available online, without registration (the demo version reveals the application capacities to the user, available also in the offline version, several options, well developed software, extremely low risks 	<ul style="list-style-type: none"> - user-unfriendly application
Opportunities	Threats
<ul style="list-style-type: none"> - it does not depend on a permanent internet connection, and offers very useful adjacent options 	<ul style="list-style-type: none"> - low risks only in the case of online use
SPINSCAPE	
Strengths	Weaknesses
<ul style="list-style-type: none"> - simple and attractive design - there are tutorials for effectively using the software - collaboration is available with persons all over the world - the conceptual maps made by other users can be viewed 	<ul style="list-style-type: none"> - it requires downloading the software - it may seem complicated compared to other similar applications - it can only be used for 7 days without paying - the website is not very well organised - it cannot be used without logging in

Opportunities	Threats
<ul style="list-style-type: none"> - at the beginning, it offers a skeleton of the appropriate conceptual map for our work field (teacher, blogger, etc.) 	<ul style="list-style-type: none"> - a faster and simpler alternative may be preferred - other websites have more high-performance applications
MINDJET CATALYST	
Strengths	Weaknesses
<ul style="list-style-type: none"> - it provides a tutorial for identifying and learning the options offered by the application - complex menu with many options 	<ul style="list-style-type: none"> - it provides a free version and a paid version, the latter being much more complex - the complex interface is not accessible to all the users
Opportunities	Threats
<ul style="list-style-type: none"> - concluding Collaboration Agreements with various educational facilities (schools-universities), in order to prepare much more creative educational applications to enhance learning - possibility to enlarge the applicability fields 	<ul style="list-style-type: none"> - a main threat is the competition brought by other applications providing the same possibilities, but better - due to the constant development in science and learning, there is the possibility for the two applications to fall behind technology-wise if there is no highly creative personnel to continuously develop them
SPICYNODES	
Strengths	Weaknesses
<ul style="list-style-type: none"> - creating different presentations compared to the usual ones - anyone can create an impactful presentation (everything is at hand) - it has a certain dynamicity in the presentation - the animations are very well-done - very beautiful predefined styles - there are many configuration possibilities - images can be placed on the background - a short description can be added at each node 	<ul style="list-style-type: none"> - it requires a little time to get to know all the elements one can work with in order to create a presentation - at first, one may get lost in the very numerous facilities - it loads very slowly - the zoom could offer more freedom, like in the case of Bubbl.us - the interface could be simplified
Opportunities	Threats
<ul style="list-style-type: none"> - once learned, it is fairly easy to use, and very appealing applications can be created - it would not hurt to have an option for creating individual styles 	<ul style="list-style-type: none"> - similar websites have appeared or will appear with much more developed aspect and possibilities - in order to create a presentation, JavaScript is required (although apparently this does not seem to be problematic, there are people who do not know how to install something like this)

MYWEBSPIRATION	
Strengths	Weaknesses
<ul style="list-style-type: none"> - high loading speed - attractive design - it provides templates - it provides the option to export in Google Docs and Word format - rich palet of shapes and images - it allows taking notes online - possibility of sharing it with other users - it allows creating groups of friends 	<ul style="list-style-type: none"> - it is not very intuitive in finding the necessary elements for a conceptual maps - it does not provide the possibility to save online - it requires registration on the website - it provides a trial version for 30 days - it does not allow export in pdf or picture format - it provides little subscription types
Opportunities	Threats
<ul style="list-style-type: none"> - possibility to store online - providing an account with fewer editing options, but freely 	<ul style="list-style-type: none"> - websites providing online storage - more intuitive websites - free accounts for competing applications - possibility to download images, pdfs to the competition
GLIFFY	
Strengths	Weaknesses
<ul style="list-style-type: none"> - software designed for the persons with more advanced skills. - there are very numerous predefined templates that one can select from. - an account can be created where all the started applications can be saved. - somewhat more complex design, but with may tools - possibility to print the project directly from the software. - share button directly from the software to any web page - compatible on several browsers - possibility to develop 3D graphical models 	<ul style="list-style-type: none"> - difficult software for the less experienced ones, crowded design for the non-professionals. - It has no offline version - It allows for creating only 5 diagrams free of charge. - It requires the creation of a user account - It supports diagrams in few formats - It has a low number of functions compared to other conceptual map applications - crowded design which can become tiresome after a longer use
Opportunities	Threats
<ul style="list-style-type: none"> - the professionals have available a complex and well-made software - there are very numerous default templates allowing for highly complex projects to be created, having different designs - present on the Google Apps market 	<ul style="list-style-type: none"> - difficult software for the beginners, who will avoid this software, preferring to use a more user-friendly one. - reduction in the number of users because of the lack of an offline version
LUCID CHARTS	
Strengths	Weaknesses
<ul style="list-style-type: none"> - Free for teachers upon contacting the company - It has a free version for the users - User friendly - Possibility to collaborate with several users at the same time - Compatible on several browsers - It has hundreds of templates - It allows “chat” in group 	<ul style="list-style-type: none"> - It requires creating a user account - More facilities involve payment

- It allows the users to create personalised images - It does not require the software to be downloaded	
Opportunities	Threats
- It allows both students and teachers to create data visual presentations - The students can publish and share the project they worked on - It promotes creativity	- It can be changed or deleted at any time by any of the collaborators - The students may stray away from the topic

III. CONCLUSIONS

The mental maps are a functional unit of mental image plus a generative scheme, a formal model that we can learn and shape through study, interiorisation or internalisation and which, by being evoked, is (re)built, enriched and refined becoming more effective, more innovative, more able to produce new systematic mental associations.

Therefore, when thought over and applied in this manner, the “mental maps enhance the linguistic/communicative functions of the pedagogical message aimed by the independent academic learning: denotative, referential, expressive, poetic, conative (implicative), meta-linguistic (related to the code)” (Ioan, Neacsu, 2006, *Independent academic learning. Methodological Guide*, page 42).

Designed to increase the taxonomic-systematising power of the student’s mind through training (mental fitness), the mental map contributes to partially using the nine types of codes attributed to the human intelligences (Garner).

A manner of changing the practices is that of working with the tools contributing to the creation of mental-conceptual maps. At this time, the Web 2.0 applications existing in the virtual environment help us change the way the courses are taught-learned-evaluated and make them more attractive.

Subsequently to using and analysing the previous applications, the authors recommend the Bubbl.us, MIND42 applications to the beginner users, as a good starting point for accumulating experience, and for the professional and more complex applications, the Gliffy, Creatly applications. Nevertheless, all the applications deserve to be personally investigated, each one of the offering different options to create the conceptual maps, which are adapted to each individual user.

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