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Educational Tools with WWW-Interactivity

PhD. Ciprian DRAGNE[1]
[1]Mechanics and Acoustics Dept, Institute of Solid Mechanics – Romanian Academy, Bucharest, România.

Abstract*—Education has become today the most important means of human development, progress, and evolution. With the tools made available by the internet, information is available to anyone with access, just one click away in the future. Information via the internet travels faster today than any TV news, any means of transportation, any exchange of ideas via phone call, any printed matter, etc. That is why most publications and newspapers have migrated massively to the internet, most TV will soon migrate to the internet, many of the orders for products and food are now made via the internet, interactions and communication between people are now mostly virtual, and even education has migrated to primarily virtual forms via the internet for training the human mind. The Internet, this engine of progress, will develop accordingly to be able to absorb man's desire to know and learn. This process has already begun, but it is only just the beginning. However, IT tools have many hidden powers and valences. Interactivity is one of these powers. The educational energy of interactivity with educational tools is as powerful as interaction with a passionate and dedicated teacher. This paper shows some research by the author to develop educational tools with interactivity over the internet. The Internet will become soon an Internet of Interactivity (IoI).*

***Keywords*—** *Education, Advances, Interactivity, IoI.*

I. INTRODUCTION

The internet has revolutionized journalism, providing a new channel for information dissemination as well as innovative ways to present data and engage with audiences [1]. Not only journalism, but the entire way of informing modern humans.

Experiments tracking a user's gaze on a screen where they see how a publication is unfolding show that text with additional interactive features is more attractive, even beneficial for maintaining the reader's attention. This fact comes from the conclusion that a moving object captivates attention better. This is a capacity that comes to us from consciousness and an adaptation of the way it functions from the times of humanity's childhood, when observing the hostile environment led to the sharpening of survival instincts.

However, internet tools have many hidden powers. Interactivity is one of these powers. Internet interactivity is the ability of users to actively participate and influence digital content, going beyond passive participation as mere spectators. Interactivity allows for two-way communication between users and the digital system or direct communication with other users, through quick links (hyperlinks) to user-generated content, social networks, personalized databases, even newspapers or TV stations, and video game webpages.

Interactivity on the Internet began shortly after the implementation of the Internet itself, in the early 1990s as a communication tool to obtain more information from users, most of this information being related to user satisfaction, interest in certain marketed products, or political candidates for public office. Obviously, these branches were closely related to how the Internet was used by advertising or rating companies.

Since the beginning of interactive websites, interactivity has proven to be much more complex than anticipated. Each person decides for themselves what to follow more closely according to their own interests. It was then observed that the definitions and terminologies found in the educational systems of that time are insufficient, that there is an acute lack of consensus among researchers, even regarding the precise definition of the term interactivity [2].

Advertising has also moved massively to websites. Advertising interest in interactivity has been studied intensively and various patterns have been developed to recognize the degree of attractiveness, and even to influence some of the users' opinions towards the products they wanted to market [3].

Efforts to classify the characteristics of interactivity have been limited to a few general phrases, however, because each user has a different opinion about each product, about newspaper title, way of presenting information or news, the attractiveness of the text read depending on the level of education, the colour scheme of the pagination, the presence or absence of information in video form, etc. [4].

Most websites today are limited to obtaining likes or dislikes through simple emoticons. This was also due to the emergence of smartphones, where access to the internet became instantaneous and the number of users viewing it increased exponentially to millions.

Mathematics was previously considered the ultimate universal language. But today, it is not just mathematics that should be considered this way, but also other sciences, including programming languages.

National educational and regional behavioural barriers will fall, and humanity will evolve towards more open forms of communication across the Earth [5].

Key aspects of internet interactivity include:

- User-to-System: The ability of a user to interact with and modify digital content in real-time websites, simulations, or AR/VR, where the system responds to input;
- User-to-User: Communication facilitated through digital platforms, including text, audio, video chatting, VR (virtual reality) or social networks;
- Multimedia Engagement: Enhancing user experience through interactive, rich media, which can increase satisfaction, engagement, and information retention;
- Real-Time Collaboration: Remote, synchronous interaction, such as live broadcasting, virtual meetings, or remote, immediate, controlled system adjustments;
- Performance rankings.

The advantages of new internet applications with interactivity:

- Easy to access for everyone all around the World;
- Direct communication of users with application managers by webpage or by other instruments (emails, etc.);
- Easy to translate in most areas of the webpages by most browsers translate control, but also can be implemented to have a multi-language system inside, especially for technical writings with specific professional text;
- Applications in a format adapted to educational programs in education systems at almost any level, or easily to be updated;
- The application can be oriented towards the user's needs;
- Applications can be developed as systems for checking and validating school performance;
- Applications can save the personal history of users;
- Applications can present values of global educational performance criteria for individual users, groups, or general values for educational institutions or at the country level;
- Better interconnection with the next level of application of the acquired knowledge - use in the practice of scientific research, IT programming, studies for personal and personalized interest;
- Checking answers using subroutines that have implemented programmable sequences;
- Such applications can be improved by having an AI assistant.

Disadvantages of new internet applications:

- Still limitations based on internet access speed, internet browsers performances, computer performances, internet programming languages performances and computer resources needed, etc.;
- It depends on the devices used. The most advanced internet tools require updates to the devices' software system and changing the devices themselves for greater computing power;
- Performance ranking can also lead to unpleasant situations of diminished self-esteem and even jealousy, especially for younger people, such as minors;
- The increased attention of users to increasingly brighter screens, more dynamic in the way information is presented to us and especially in their interactivity, will also reduce the time spent on activities recommended for health: outdoor activities, sports activities, hiking, reading books and listening to music for recreational purposes, other crafts - drawing, painting, poetry, dancing, gardening, household activities, games, cooking meals, helping others, etc.

AI is now coming to help educational systems to evolve. AI will permeate education as much as almost any other field of activity. Humanity must adapt. There will be many social obstacles, but changes are inherent.

There are papers in References that explain other details of interactivity on the Internet, most of which refer to the two-way, technology-mediated, real-time communication between users and digital systems or other people. This involves active participation, such as social networks, chats in games, website navigation, 3D virtual environments, and collaboration tools that allow immediate feedback, content modification, history checking, user performance listings, etc. Most of these articles refer to media content and advertising. There are a few approaches with an obvious educational purpose.

II. Literature Review

It is already unanimously recognized that today we are in an advanced phase of the 2nd generation of how information is presented on the Internet [6].

Other internet access pages that have been developed more are those that allow us to access games. The gaming industry has been present since the advent of the computer. Now, it finds in the internet just another possibility of manifestation.

Despite the rich literature on the interactivity of websites with general interest, articles on interactive educational websites are lacking. We have to go back to education. The Internet is the greatest library of humanity. So, in this context, education has also started to evolve through this library.

The most well-known and developed educational website that is also free is Wikipedia. Other pages worth mentioning are Encyclopedia Britannica or the scientific journals MDPI, Springer Journals, IEEE, ResearchGate, etc. Some of them have accessibility with paid subscription.

A top 100 Journals in the world can be viewed at the Academia-Insider web journal [7].

Interactivity in internet applications has become a concern due to internet abuse and the explosion of sensitive information, not recommended for certain segments of the population, or the proliferation of violence via the internet.

A particular area of internet applications belongs to those applications that more closely monitor users' reactions and their concentration in special for children's [8].

III. Methodology

This paper shows some research by the author to develop educational tools with interactivity over the internet.

The development of a website is restricted today by several factors:

- Security level of information and access to internet pages. This is the most important feature of a website;
- Internet applications used for access. Internet pages work differently depending on the application used. Page display webpages have evolved towards the possibilities of displaying information as easily as possible and as attractively as possible;
- Tools for developing complex and attractive websites. In line with the latest features implemented in the applications to display web pages;
- The speed and ease with which a web page loads to the end user, factors that determine the computing power of the devices that are used to display web pages;
- The level of specialization of the person who created the website. Today, it is necessary to know several programming languages in order to create an attractive website;

- And last but not least, the traffic speed provided by the user's internet provider.

The performance evaluation of a website with interactivity (but not only) is done today according to several characteristics, many of which are not related to the criteria expressed in the previous list, but according to:

- Interactive graphics easy to understand;
- Interactivity ways – multiple mouse buttons, finger touch to interact, etc.;
- Quality of information's and clear explanations;
- Ability to rate articles;
- Existence of subscription;
- Search features;
- Ability to contact the authors;
- Comments section;
- Hyperlinks in articles;
- Audio and video in webpage;
- Detailed information's about accessibility and required computer performances;
- Appropriate color scheme;
- Propriate content to user age;
- Reduced fatigue during prolonged access.

The Internet will become soon an Internet of Interactivity in almost every click (IoI). It has been shown that increased interactivity improves user engagement, improves learning outcomes, and enhances, for example, the effectiveness of online learning or the experience in a 3D virtual classroom.

The foundations of these IT applications for the internet are obviously HTML, CSS, JavaScript, web-GL and specialized web browsers. But also, additional programing skills are needed for any inside necessities in C++, Python, etc. or image processing skills for results in pictures or video presentations.

By using the reference web link for some web-GL applications, detailed documentation, explanations, and methodologies can be viewed to learn how to develop such applications.

IV. Case Studies

In this chapter will be presented some educational examples implemented by the author as interactive applications on the web-blog [9].

The best method to understand is to see by yourself how interactive application could works in practice.

Each example has some explanations, internet links for easy observation, explanations about educational level involved and recommendations for better understanding and with multiple way for solving.

These internet applications are developed in the right manner for interacting with users who want to learn, with a statement, time for the user to write down their own drawings, and an explanation for solving step by step.

In general, all these applications are recommended for anyone.

A. Application with advanced web-GL tools

This example (fig. 1) is a good test for your computer performances. The example shows the main components of an electric motor in animations. Use recommended buttons and tasks to rotate the model view or zoom in for the best perception.

Use the next weblink to view the application:
https://www.glowscript.org/#/user/GlowScriptDemos/folder/Examples/program/ElectricMotor

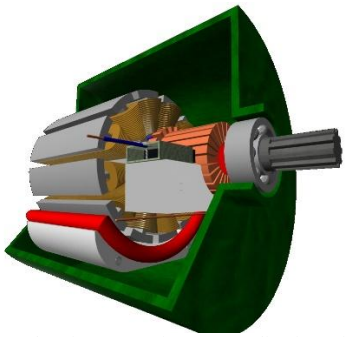

Fig. 1. Components of an electric motor – internet application with interactivity.

The application could be improved in the future with additional explanations.

B. Double pendulum internet application

A double pendulum internet application can be viewed in this example (fig.2). The equations of motion for the complex system are implemented inside.

Use the next weblink to view the application:
https://www.glowscript.org/#/user/GlowScriptDemos/folder/Examples/program/DoublePendulum-VPython

Fig. 2. Motion of Double Pendulum.

This web application could be improved in the future with additional models and interactive selection.

C. The chemical reaction of neutralization between a base and an acid

This is a simple example with animation of a chemical reaction (fig 3).

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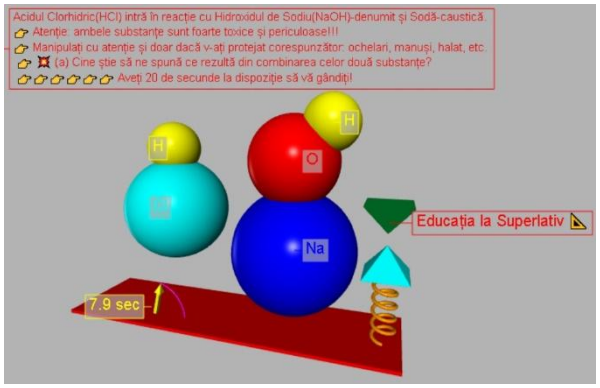

Fig. 3. Chemical reaction of neutralization

For viewing the application, please use the next weblink: https://educatia-la-superlativ.blogspot.com/2025/11/chimia-distractiv-interactiva-reactia.html

This example can be improved with a complete chemical equation containing all quantitative data about the materials involved.

D. An interactive table of Mendeleev

Personally, I have often wanted such an application, where chemical elements are presented in an advanced way. This is the first such internet application developed by me. The page also has biographical information about the great physicist Dmitri Mendeleev, who first arranged chemical elements in a table according to clear selection criteria (fig.4).

For viewing the application, please use the next weblink: https://educatia-la-superlativ.blogspot.com/2025/11/chimie-distractiv-interactiva-tabelul.html

This example can be improved with additional information about each chemical element.

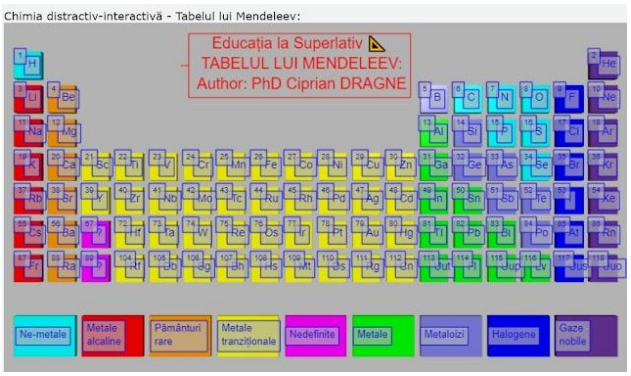

Fig. 4. Table of Mendeleev.

E. Complex internet application for mathematics

This internet application shows a math problem with statement, solutions with interactive features and multiple solutions to solve the problem (fig 5).

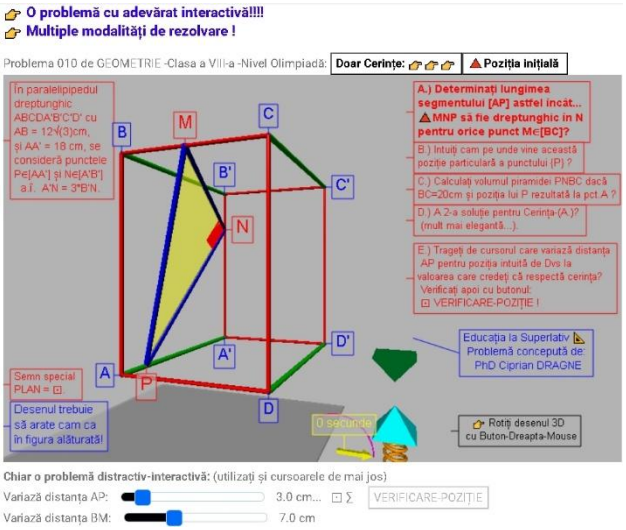

Fig. 5. GUI of an example for a math problem with statement and solutions with interactive features.

Use the next weblink to view the application: https://educatia-la-superlativ.blogspot.com/2026/01/mate-problema-010-geometrie-nivel.html

This example can be improved with a parametric mathematical model.

F. Algebra explained with graphics

A math example with an algebra problem is presented next (fig 6).

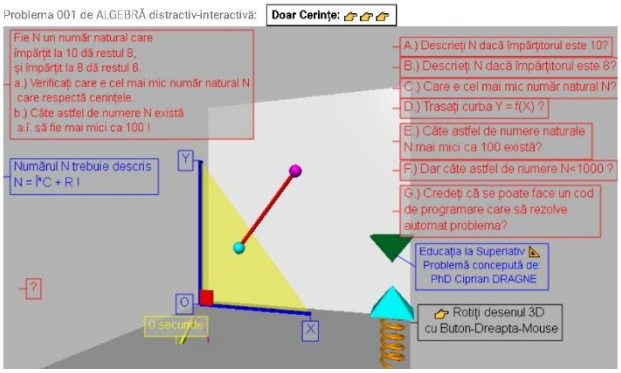

Fig. 6. Algebra problem with graphics.

Use the next weblink to view the application: https://educatia-la-superlativ.blogspot.com/2026/01/mate-problema-001-de-algebra.html

This example can be improved with more mathematical models in the same application.

G. Applications with proofs of well-known theorems

A math example that explains how was proofs well-known theorems from Geometry field - The 15 Degree Angle Theorem. This theorem said: "*In a right-angled triangle, if an angle is 15 degrees, then the height corresponding to the 90-degree angle is one-quarter of the hypotenuse.*"

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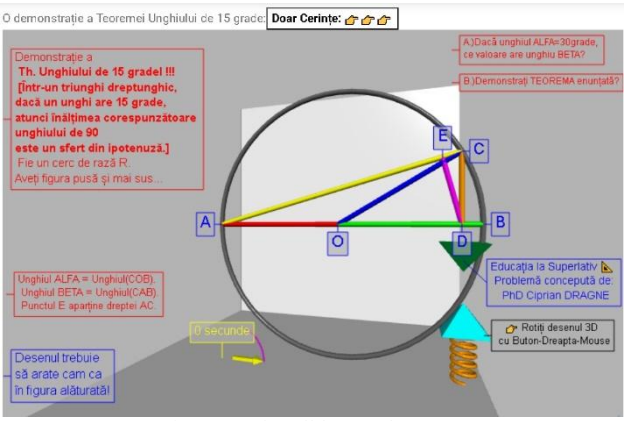

Fig. 7. Proofs well-known theorems.

Use the next weblink to view the application:

https://educatia-la-superlativ.blogspot.com/2025/12/mate-teorema-unghiului-de-15-grade.html

This example can also be improved with more solutions and more mathematical models.

H. *A complete lesson for Physics*

A complete lesson for Physics can be viewed at the next case study. The lesson has the goal to achieve skills about Pulleys mechanical systems. The application has additional information about pulley systems, a history of pulleys and information about World Records in manufacturing huge pulleys.

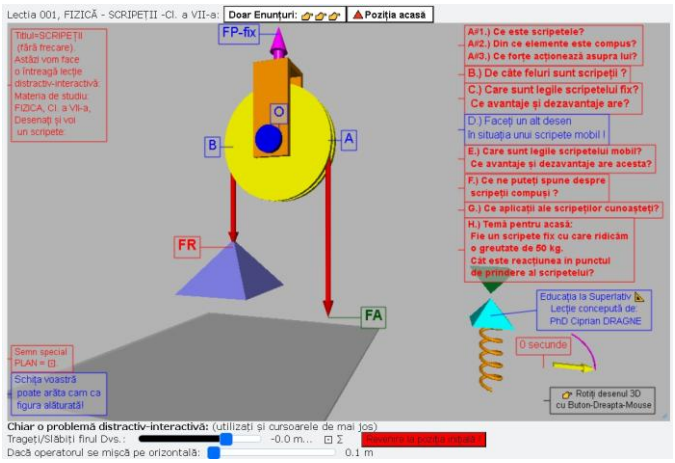

Fig. 8. Complete lesson for Physics – Pulley systems..

Use the next weblink to view the application:

https://educatia-la-superlativ.blogspot.com/2026/02/fizica-lectia-001-scripetii-cl-vii-a.html

This example can also be improved with more examples, more interactivity and more home works.

I. *Another fun-interactive Math exercise*

Another fun-interactive Math exercise is presented next. Interactivity become more complex if the models are defined as parametric. The application also presents a graph area for specific functions, in this example, like distances between points, area of a quad, and the volume of a pyramid.

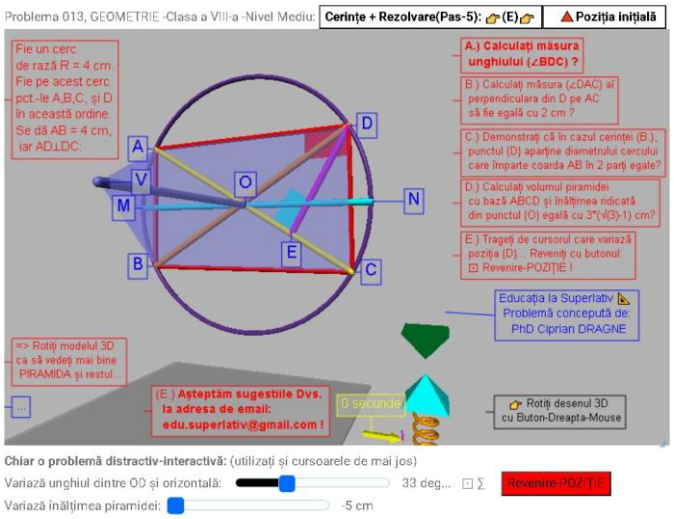

Fig. 9. Another fun-interactive Math exercise..

Use the next weblink to view the application:

https://educatia-la-superlativ.blogspot.com/2026/02/mate-problema-013-geometrie-cl-aviii.html

This example can also be improved with more results, more interactivity and more home works.

J. *Another fun-interactive Math lesson*

A fun-interactive Math lessons with parametric model, graph area and multi-language interface (Romanian, English and French).

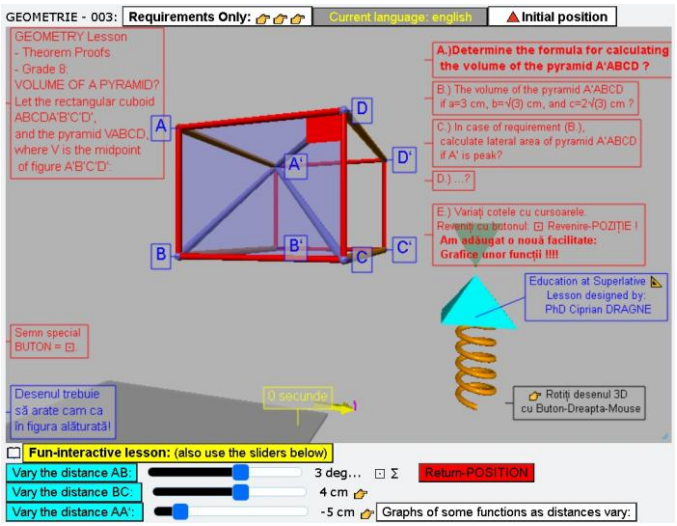

Fig. 10. A fun-interactive Math lesson with multi-language interface..

Use the next weblink to view the application:

https://educatia-la-superlativ.blogspot.com/2026/02/mate-lectia-003-geometrie-demonstratii.html

This example can also be improved with more results, more interactivity and more home works.

V. CONCLUSION

I hope that now, the purpose, the results obtained so far and the performance of this study are clear.

The attractiveness of web pages that also have interactivity, especially for educational purposes and

especially for younger ages, can be fully observed in these applications used in this article.

The advantages are obvious. The education system will not only be increasingly involved, but will be truly conquered by new technologies. And not only education, but also any Research and Academia.

This technology will also be adopted by other internet applications, including mass media or scientific journals.

Future internet applications will involve more 3D models and data in their capabilities, for better understanding, easier viewing of the results, and more complex research studies, with multi-physics capabilities [10].

This also new technology for using more complex mathematical models in research, has now the name of Digital Twins [11].

Additionally, supplementary applications should be developed on local computers to assist in the development of such interactive internet applications [12].

Unfortunately, a trend has already been reported on the internet today of being overloaded with almost useless posts and information, just for entertainment and ratings.

Entertainment is good, but a good education is better.

Fun-interactive lessons are the future of education, and not just education, but any way to receive information: articles, books, web applications, internet interaction for medical purposes, newspapers, even entertainment, gaming, and advertising, etc.

At this moment, most of the web applications were developed only in my native language. Has the intention to develop multi-language web applications in the future.

This paper wad developed using V-Python applications [13], JAVA, CSS, HTML, PYTHON software and other author codes and resources [14] .

Future research:

1. Study for more complex interactivity applications;
2. Study for new ways to present data;
3. Improved GUI for visualization and results;
4. Interconnectivity with similar web-applications;
5. Improve communications with users.

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DECLARATION OF CONFLICTING INTERESTS

The author declares that has no conflicts of interest.

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