

# **The Integration of Artificial Intelligence through the DRAKON Technolanguage in Educational Role-Playing Games**

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**ABSTRACT:** The use of DRAKON diagrams facilitates the understanding and learning of complex concepts, and structures algorithms that allow role-playing games to be integrated with artificial intelligence, by means of an application that interprets them as input to the system. Using machine learning algorithms and language models, the AI analyzes the behavior of the students and adapts the game, providing personalized feedback to improve their performance. In addition, the language models generate text and dialogue in the game, creating a more immersive and realistic experience.

**KEYWORDS.** DRAKON, role-playing games in education, artificial intelligence, collaborative learning, gamification, intellectual terrorism.

## **INTRODUCTION**

Currently, education is going through a transcendental moment where technology is making its way into a new industrial revolution. Concepts such as nanotechnology, robotics and artificial intelligence are realities that the world is experiencing and generating rapid and disruptive changes, reshaping the economy and society, while educational models remain trapped in the past, facing difficulties such as: the memorization of data; reward and punishment as an incentive; the accelerated virtualization at a time of pandemic; the precariousness of non-formal online education platforms, which only bet on technical and programming knowledge; and the disarticulation of the working world with the educational world.

This has led people to question the usefulness of education, learn from online courses, and look for a job as a programmer being high school graduates or professionals in other areas. In a world where empirical and non-technical knowledge has a quick but devalued labor market, formal education is only accessible to a minimum percentage of the population that has the material conditions to access a private education or the few places available in a public and quality university.

## **PROBLEMS AND THE LUDUS AS A GAME AND A TEACHING TOOL**

Intellectual work faces various problems visible in everyday life at different levels, from the child who is frustrated at not being able to understand arithmetic and decides that his life project is away from mathematics; the teenager who prefers to spend hours between video games or watching short videos on social networks; the university student who suffers doing his thesis counting the pages and counting the days for the final delivery, or a brilliant scientist like Carl Friedrich Gauss who confesses "I prefer death to this life". In this way, formal education faces new challenges to make it effective and transcend beyond the classroom, enriching the life projects of each person who participates in it.

This social phenomenon is called intellectual terrorism. The mental overload that people must endure is growing, the system of moral values and social norms imposes on people a style of work that leads irremediably to physical and mental exhaustion. "The paradox is that intellectual terrorism, although it causes serious neuropsychiatric and other diseases and suicide attempts, is not considered a violation of human rights within the existing system of moral views and norms" (Paradzhanov, 2001, p. 15).

In addition, the lifestyle imposed by the current economic model has generated that people seek an immediacy of work, where they do not care about acquiring knowledge, but only a quick job benefit that does not require technical or professional knowledge. Common thoughts such as "you have to study something that gives money" or "why study at the university if they only pay me a minimum wage?" show a phenomenon where education is only seen from a Machiavellian perspective of results and not of processes: anything goes for an economic compensation.

In this disorder of educational perspectives, there have emerged course merchants who take advantage of fishing in troubled waters, propagating false ideas that in a modern world formal education has no place. They sell that the best way to make the best use of time and money is to take courses and tutorials of "practical" knowledge and programming; that despite being freely available on the Internet, when compiled in these non-formal online education platforms, they use advertising that promises magical results and high salaries.

In reality, these platforms can only impart data in one way, in a closed and non-collaborative, self-imposed way, and away from real problem solving that isolates the learner from a social learning environment. It does not allow him to improve his means to learn, but only to be an observer. Thus, when the person finishes the video tutorials and faces real working life, they see what was promised unfulfilled. This is when these platforms blame the student for not having discipline in their self-learning, but do not take responsibility for their repository of courses disguised as a teaching methodology.

A teaching methodology is needed that revalues the formal education system in a way that reinvests current social norms and makes use of current information technologies to support learning. This methodology should make the educational system a collaborative one, which encourages student autonomy and frees knowledge from intellectual terrorism.

In this way, the student will see learning as a pleasurable activity and will seek to incorporate formal education into his or her life project.

Ludification is a teaching strategy that incorporates game mechanics in an educational environment. It should be remembered that Ludus is the term used in ancient Rome to refer to schools, but it also means entertainment, play or amusement. This meaning is no coincidence, since the objective of play from childhood is to incorporate basic knowledge and skills that allow a person to survive in the world through experimentation.

There are a multitude of games and didactic ways to transmit knowledge, but we will focus on the so-called role-playing games (RPG), since by their nature they allow a game session to integrate people, to be aimed at a specific objective, to promote a narrative, and to have participants guided by a game master who develop the activity. All artifacts present in an RPG convey emotions that are important to inspire a learner. "Artifactual emotions are those that generate our response to a work as an artifact or crafted art object" (Frome, 2007, p. 832). Also, each play session is progressive and allows for a full syllabus to be covered from a different perspective than traditional and outdated methods.

To support the development of role-playing games, a visual technolanguage will be used to share information in a more efficient and user-friendly way. This language called DRAGON facilitates the construction of algorithms with visual elements. Additionally, being a technolanguage, it is possible to derive its content to source code to be interpreted by an artificial intelligence system capable of creating narratives, characters, environments and other features. In this way, the gaming experience is enriched, allowing the teacher to focus on the course content.

We met artificial intelligence with the advent of tools such as ChatGPT or DALL-E, two tools that allow generating text and images through a user's text input. This has brought a barrage of comments and panic about how their misuse can bring cases of fraud and encourage laziness in being able to perform the tasks and solve the problems to be done by the student. "Of the multiple applications of this tool, the greatest debate is focusing on its implications in education and academia, because of its tremendous power to generate texts that could very well pass for human creations" (García Peñalvo, 2023, p. 24). However, there is great potential in the use of artificial intelligence in teaching and learning processes through the use of language models, which can enrich the experience of participants by allowing the creation of dynamic characters and environments. Non-playable NPC characters can be controlled by AI to respond more naturally to learner interactions and decisions, and adjusted to create personalized dynamic experiences.

In addition, through the use of machine learning algorithms, the AI can analyze the student's performance during the game, providing feedback to educators. In this way, performance and progress in the game is evaluated to identify improvements and adapt the activities that will be presented to the student. Thus, the difficulty and complexity is adjusted according to the level of knowledge and skills of each student. The challenges presented will be appropriate by confronting the student with realistic situations, making decisions and seeing the consequences of these decisions. This allows for the encouragement of participation,

and more effective and meaningful learning. Another important point is to facilitate collaboration and teamwork among students, promoting group decision making and joint problem solving. It is also important to explain that this is a new opportunity for students with learning difficulties and limitations, "accustomed to being negatively valued, both in the academic environment and within their own family environment, being unable to re-engage in the normal rhythm of studies that they neither understand nor value. Therefore, we believe that this type of active methodologies are not only appropriate but, in the end, inevitable and necessary" (Rodriguez, 2019, p. 50).

To define the RPG activities we will use a visual algorithmic technolanguage that will help us to convey the knowledge and game mechanics, which has its origin in the Union of Soviet Socialist Republics, "In the development of the on-board and ground software for the orbiter "Buran" the programming languages PROL2, DIPOL, PSI-FORTRAN, LAKS, ASSEMBLER and others were used. The first three were developed at the Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences. The experience gained with the application of these languages has given rise to the concept of the visual programming language DRAKON (the name comes from the Russian abbreviation for Friendly Russian Algorithmic Language Providing Clarity)" (Paradzhanov, 1995, p. 143). DRAKON diagrams can be used as a visual tool to represent and structure systems, processes or algorithms, improving the understanding of easily elaborated concepts, since they do not require an experienced programmer for their realization. They help to communicate complex concepts in an easy way by organizing information in a structured manner.

*Algorithm is defined as "precisely described sequence of human actions" (Paradzhanov, 2001, p. 10). Any system can be represented through algorithms. DRAKON is a technolanguage that "allows (like any other algorithmic language) to design algorithms, write programs and translate them into object codes. On the other hand, it allows unification of the recording of technological processes of any nature in any subject area" (Paradzhanov, 2001, p. 47). In this way, we can use DRAKON diagrams to describe the course content, so the student has a tool to visually understand the subject of study. It also allows translation into machine code as an input for the AI system to generate the casual elements of a role-playing game. Thus the teacher will have a tool that facilitates his work and enriches the gaming experience for the participants.*

The DRAKON technolanguage, as an artifact of visual representation, "allows expressing any technological knowledge in any thematic area in a UNIFIED STANDARD FORM" (Paradzhanov, 2001, p. 48). In this way, clear rules and a standard for the realization of educational role-playing games are established, so that it is possible for any teacher or entity to incorporate this methodology, and "play the role of intersectoral and interdisciplinary language, contributing to the solution of the most important problem: the problem of mutual understanding between scientists and specialists" (Paradzhanov, 2001, 48). This helps to close the gap of understanding that arises between students, teachers and other participants of education.

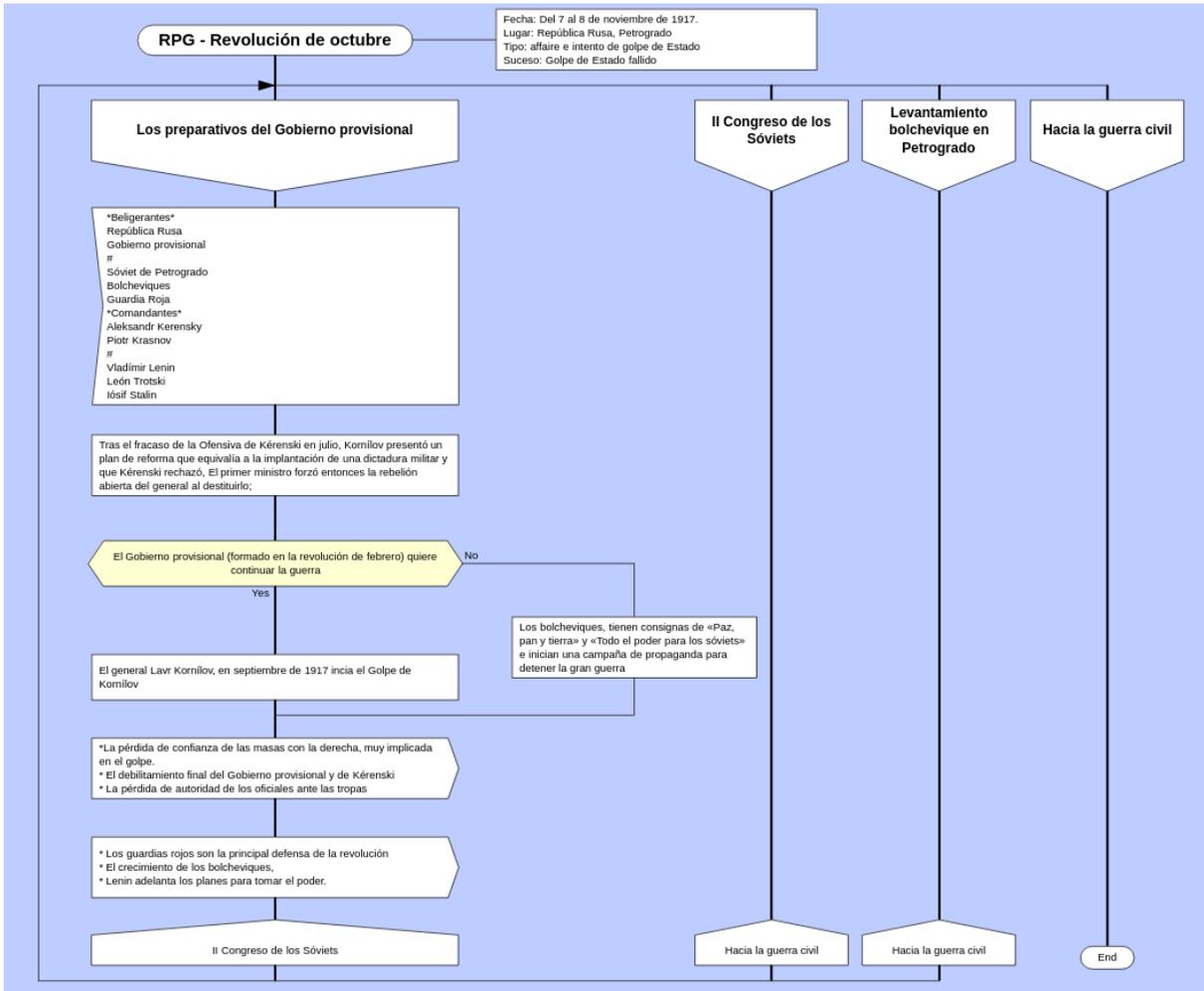


Figure 1 - RPG diagram. October Revolution.

The structure of the DRAKON diagrams defines the activities to be followed by the participants during the game session, and the elements to be generated by the artificial intelligence to set the mood of the game.

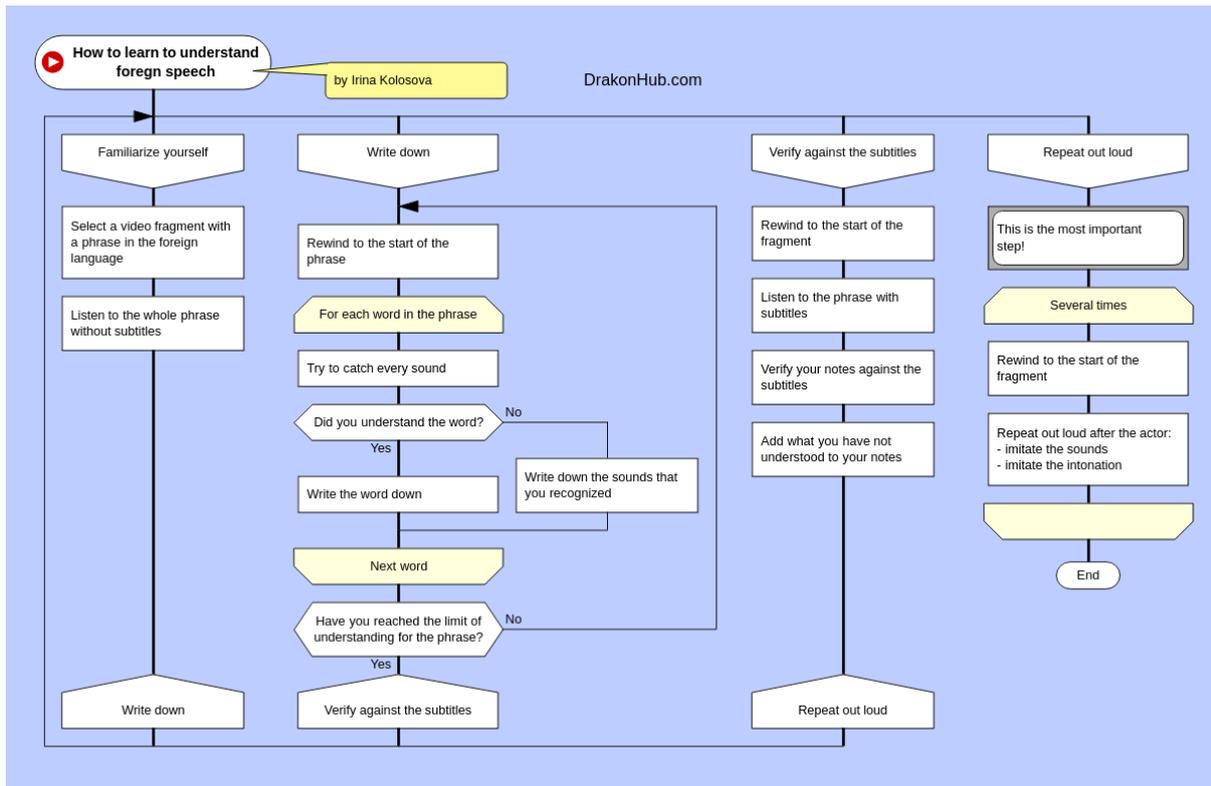


Figure 2 - How to understand a foreign language (Irina Kolosova, 2024).

DRAKON diagrams can be used to create mind maps that help students sort and visualize information to facilitate learning in any area.

## CONCLUSION

The implementation of new methodologies that take advantage of the technologies present in education is necessary to develop greater motivation and interest in the student in educational life. The integration with artificial intelligence, using DRAKON diagrams in role-playing games as a transmission method, offers many advantages for both parties, improving teaching processes, creating enriching experiences for the collaborative construction of knowledge, integrating students who go from using non-formal online education platforms that only make them passive observers to active participants in the construction of knowledge from public and quality education.

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