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Adaptive learning to enhance students understanding in learning technology experience

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Abstract. One of the difficult problems at the present stage of development of education is the creation of conditions for the full realization of the student's personality. As one of the ways to solve it, the creation of an adaptive educational process is considered, which is built taking into account the capabilities of students, focuses on meeting their diverse needs and interests, provides conditions for their life self-determination and self-realization, creates a favorable psychological climate for the pedagogical interaction of all subjects of the educational environment. Thus, the paper is based upon adaptive education technologies used to reflect the cooperation of subjects, dialogue, the solution of personally significant tasks, free testing of experience.

Keywords. Adaptive learning, students, learning technology experience

Adaptive learning to enhance students understanding in learning technology experience

The introduction of modern adaptive educational technologies in the system of training social teachers at a pedagogical university contributes to a departure from the general orientation toward the average student, the development of varied educational routes, updating curricula, expanding educational services, finding additional resources to improve the quality of students' professional training, and optimizing the development of the future specialist's competence.

One of the main challenges that education currently has to do with the characteristics of pedagogical practice is the role of the teacher as a source of knowledge continues to prevail. Despite the incursion of new information technologies in almost all areas of our lives, their application to improve and update the instructional process is still limited if we analyze it from the point of view of the potential they offer to promote learning that goes beyond the provision of information.

The traditional practice of prescribing the instructional process has serious limitations that come from questioning the behavioral model. This has led to the search for broader approaches that consider learning as a holistic process of the individual and the development of cognitive structures.

Integrating the concept of how knowledge is generated with the potential offered by ICT allows reorienting the traditional instructional process by creating learning environments directly linked to the construction of significant knowledge and facilitating students to be more adapted to the requirements of the information society and face university studies with more resources.

Thus, education in an adaptive learning system is not only a message of ready-made information but also the formation of a system of mental actions with which the student acquires knowledge, skills, and abilities. The main strategic task of the teacher in an adaptive education system is to include the student in independent cognitive activity, transfer him to the position of the subject of this activity.

A society that increasingly requires greater skills, cooperation, and connectivity, requires forms of teaching that foster collaboration, dialogue, and the construction of shared knowledge. ICTs are an instrument of educational innovation because activities predominate over content, creative student participation, and collaborative work. The use of ICTs as a real part of the teaching-learning process in a global way and coordinated with a pedagogical project that allows coherence to educational innovation.

By adaptation, we mean a complex dynamic process leading to the coordination of the management activities of teachers with the managed and self-governing activities of students in the vocational training system. The consistency of this interaction is achieved (Kleisch, Sloan, & Melvin, 2017):

- Recognition of the student as the main subject of the learning process, determining the means of its development by identifying and structuring the subjective experience of the future specialist, its directed development in the learning process;
- Psychological and pedagogical diagnostics of the student's personality development, determination of the needs and motives of students;
- Managing influences of the teacher, adapting the process of professional training and holistic development of the personality to the individual typological characteristics of students;
- A high degree of student self-regulation, relying on the reflection of their activities.

The main characteristics of the adaptive educational system include the presence of technology that ensures the design and implementation of such systems. An analysis of scientific research and the practice of professional training of teachers shows that in the adaptive system, various pedagogical technologies can be used: cyclical, level differentiation, adaptive teaching methods, modular and multi-profile. Common to all these technologies is the structuring of not only the content of education but also the activities of students with a focus on independent work, self-development of the personality, its activity and creativity, providing assistance and multifunctional support, increasing the responsibility of the future specialist for the result of his activities, creating conditions for testing and manifestations of their capabilities.

Adaptive educational technologies are the main tool for the implementation of integration processes in the development of general and particular methodological solutions for the formation of the professional competence of a social teacher (Kerr, 2016). The task of technology as a means of forming the professional competence of a social educator is to provide the necessary academic conditions for the realization of this goal.

Professional competence is the sphere of application of professional abilities of a social teacher, realized only with the integrated application of technologies that allow controlling the ability of a social teacher to perceive universal values in the process of human interaction. The formation of professional competence includes all possible methods and techniques of pedagogical activity that are used in teaching students in the process of university training.

One of the main tasks of improving the quality of training of future social educators is to strengthen the influence of students on the course of the educational process - to increase their role in managing a university and to participate in monitoring the quality of education. These goals correspond to the integration into the educational process of methods of active design when the student is the creator of the educational process. At the same time, the

emphasis is placed on the development of creativity in achieving results on the identification and elimination of problems in the professional development of a specialist, flexible approach. In the context of university education, the objectives of project activities are various educational projects implemented in the form of individual educational routes (IOM) in the framework of one or more academic disciplines (Johnson, & Samora, 2016). An educational route is being developed that directly serves the development of students' intellectual and creative abilities, the formation of the structural components of their professional competence in solving research, and practical problems.

Interdisciplinary technology contributes to the achievement of uniform learning outcomes for learners in a shorter time due to the most relevant content in terms of difficulty for each student.

Implementation of adaptive learning is possible on electronic educational platforms that have several basic components: a data collection system, a conclusion system, and a personalization system.

The first component is a data collection system. It collects and processes data on the knowledge and skills of the student. It consists of adaptive ontology and means of model calculations. The ontology displays the relationships between individual concepts, which are then integrated into the required taxonomies, goals and student interaction algorithms, model calculations tools that process data in real time, and analyze them for future use (Huda et al., 2019).

The second component is the pinout system. The component is responsible for data conversion and generation of conclusions based on all the collected information about the student's progress. It consists of quality, a learning strategy, and a feedback mechanism. Quality describes tools for assessing the knowledge and skills of a student, the parameters of educational material, and the effectiveness of training. With each new level, information about the student is updated. The learning strategy takes into account the student's sensitivity to changes in teaching, assessment, and the pace of learning. Feedback mechanisms combine all the data and transfer it back to the data collection system.

The third component is a personalization system. Personalization is responsible for the didactic value of the entire adapted training system - for building an individual educational route for each studied subject or its section. It consists of the quality of recommendation tools, predictive analytics, and training history. The recommendation tools provide students with ranked suggestions on what the student should do next, adjusting the learning objectives, strengths, and weaknesses of the student, his involvement. Predictive analytics tools calculate the degree and probability of achieving the goals set by the teacher, the expected grade, level of knowledge, and skills.

In this way, the literature on the processes of change has taught us that innovations can arise within the school or from outside it. Still, for them to be maintained, certain conditions must be met, since innovation can arise with certainty. It is stated that 28.5% of teachers do not use information and communication technologies (ICT) and that 30% of teachers make occasional use (less than once a month). The remaining 41.5% of teachers state that they make regular and systematic use of ICT in their classrooms, although with very different degrees of intensity (Yang, Tian, Sun, & Yu, 2019).

Among the reasons that teachers point out for never using technologies, the study shows that the most important are: not having access to the necessary technology, not having the necessary ICT skills, perceiving that it is not useful for their subject, and not being a priority for your school.

In the process model that we have commented previously, the context, both internal and external to the school, influences in a decisive way in each of the phases that innovation goes through. The external context includes not only in surroundings close to the school (cultural, social, family, economic aspects) but the prevailing discourse in society in general. Thus, schools located in socio-economic and culturally disadvantaged contexts can favorably influence the teachers who work in them, motivating them to implement innovations that contribute to improving the educational environment in the center and the classrooms.

The influence of the external context is decisive in the initiation of innovations. The context is also related to the prevailing discourses, and today the technology discourse has hegemony, either due to the effect of the media or due to the fact that the students themselves are users of technology (digital natives).

But together with the external context, we have to pay attention to the internal context of the school, its climate, culture, leadership, relationships, etc. And here, we find that innovation must emerge and be integrated within a human group in which leadership processes are crucial (Dziuban, Moskal, Johnson, & Evans, 2017). Leadership does not have to be associated with school management but must be distributed among those teachers with greater involvement and ability to create a favorable environment for innovation.

In the study to which we have previously referred, in which we study educational innovation projects in Spain, we found that there are some dimensions of the external and internal context of the school that help make innovations sustainable:

- A high number of teachers involved in innovation.
- Attention to the needs felt in the school.
- Clear leadership, driver of innovation, and integrator.
- External support and recognition.

But what characterizes innovation projects is the existence of organizational culture in which the values of initiative, involvement, responsible autonomy, communication, collaboration, respect for ideas, the permanence of certain traditions, they are part of the collective thought and identity.

One of the permanent problems in educational innovation is its poor sustainability. Educational innovation projects in schools have a short life. Multiple threats hinder the possibilities of continuity of these changes. Good because the leaders of change leave school because resources are depleted, because other teachers interfere and make change fail, because of the intensity of the work that can be done to organize teaching differently, etc.

In the case of innovations that incorporate technologies, as we have seen, they are at an added risk if what is desired is to go beyond understanding technologies as complementary resources to the traditional teaching model.

In general, in relation to educational innovation, the problem is not its first stages of initiation and experimentation. The problem lies in the institutionalization phase, that is, the phase in which the new ceases to be new and is integrated into the culture, beliefs, and teaching practices. For this reason, some theorists and researchers of educational change have applied the concept of sustainability (Kerr, 2016). Sustainability, from the point of view of Huda et al., (2019), "has to do with how a particular initiative can develop without compromising the development of others in the environment that surrounds it now and in the future."

And for innovations and change to be sustainable, these authors have coined some principles. Thus, the changes should have:

- *Depth*: innovations should promote deep and lasting learning in students, which goes far beyond mere memorization or study of superficial content. This is something that they have already pointed out from research in the learning sciences.

- *Length*: changes and innovations must have continuity over time; that is, they promote and care for their history, integrating new members, and continually modifying innovation so that it remains alive. And here, the figure of the leader plays a crucial role.

- *Width*: in the processes of change, they fade away and try to involve the more people, the better, so that the knowledge acquired is distributed.

- *Justice*: innovation and change do not intentionally harm or harm anyone.

- *Diversity*: innovations encourage and respect the diversity of ideas and practices and are against standardized and linear procedures.

- *Resources*: the changes take care of the material and personal resources at their disposal, caring for people, recognizing their effort, and demanding according to their possibilities.

- *Conservation*: the innovative centers maintain and defend their institutional history and biography, maintaining their identity and looking towards their present and future development.

These principles that Fuchs, Henning, and Hartmann (2016) have enunciated come to support the idea that innovation is a process that must be understood over time, which involves people, but which should be aimed at improving the quality of student learning. We can conclude that for the school to continue to be a space for innovation (with technologies), we need to renew the commitment to quality learning in students. And for this, we must dare to review both the curricular contents that make up the school curriculum and the teaching and learning processes in force in our schools and institutes. And this means serious work for teachers as education professionals.

The urgency of the problem of implementing the adaptive function of vocational training is primarily determined by the needs of the formation of adaptability of a young specialist who is able to adapt to conditions that are constantly changing. It is logical that the process of adapting students to a future profession depends on the effectiveness of their professional training. We presume that the system of educational activity of a university teacher should be professionally oriented, that is, subordinate to the implementation of the main goal of training - to prepare a specialist who is able to quickly, without conflict, adapt to constantly changing conditions of professional activity.

Personally oriented technologies for organizing educational activities necessitate the formation of such an educational and professional environment that, in the complex of all components of teacher training, ensures the integration of professional and personal. At the same time, adaptive processes are called upon to contribute to the formation of this environment and the achievement of the goal of developing the personal and professional qualities of the future teacher.

From the point of view of the above, types of adaptation differentiate due to the predominance of accommodation or assimilation processes. The dominance of accommodative tendencies in the structure of adaptation is fixed provided that the student, as the subject of educational activity, will be more oriented towards innovative teaching technologies and future professional activities. In this case, adaptability as a personal quality will be formed on a personality-oriented basis, realizing the own potential of qualification development as a prerequisite for accommodation to more difficult conditions for learning a future profession.

Based on the approaches presented above, the following theoretical and conceptual approaches to the implementation of the adaptive learning function are defined (Johnson, 2016):

1. The adaptive learning function of students should be considered in a system with the organization of educational activities in the context of the most significant relationships and

dependencies between its elements that determine the overall effectiveness of the educational process and adaptation to the conditions for its implementation.

2. Adaptation to the conditions of the organization of educational activity, which is acquiring a tendency to switch to the standards of innovative education, as well as adaptation to the characteristics of the future profession, can be a system-forming factor that ensures not only the effectiveness of training but also its focus on the implementation of the adaptive function.

3. The adaptive learning function is implemented in all types and forms of educational activity, among which independent work has high potential since the student is the main subject of its implementation.

4. The effectiveness of adaptive processes directly depends on the overall effectiveness of the educational process, the high-quality solution of educational problems; otherwise, adaptation will be implemented to a greater extent as an assimilation of the constituent external conditions created by the teacher.

5. The adaptive learning function is realized to a greater extent through the motivational, procedural, reflective components of educational activity, which integrally determine the student's adaptability level as a personal quality.

6. The highest value of the implementation of the adaptive learning function relates to the creation of conditions that contribute to the optimization of the student's professional and personal self-development. Since the main subject of its implementation is a student.

So, the essence of adaptation indicators was analyzed in the context of the general structure of the organization of educational activity, which is implemented according to three components: value-motivational, process-activity, and resultant-reflexive.

According to the indicated parameters, the first block of indicators concerns the understanding and acceptance of the peculiarities of the organization of educational activities at a university, in particular, the fundamentals of its organization on a credit-modular system of vocational education, personally oriented technologies for organizing educational activities.

Therefore, the determination of the level of formation of the motivational basis of training is associated with the adoption of new educational standards, which, first of all, determine the psychological readiness of a student to form and develop his own concept, methodology, mode of educational activity in the process of professional formation. It is important here that the student's general desire for such a level of educational activity, which is favorable for self-realization, provides a feeling of success in an educational activity. Holmes (2016) treats orientation as the central link, without which it is impossible to develop professionally important qualities of a teacher, "as a hierarchical system of dominant personality motives."

Value motivation block: The desire for self-realization in educational activities. Perception of training as a means of achieving future professional success, the sphere of personal self-realization Identification with the ideal of a teacher. Emotional-value attitude to the teaching profession. Focus on future professional success. Self-realization in educational activities Integral ability to adapt in the modern socio-economic space. The ability to fulfill an appropriate social role. The formation of personal qualities necessary for the profession. The formation of a personality capable of self-realization in living space.

Process-activity block: The ability to set educational goals that are adequate to their capabilities, forecasting the result of activities. The ability to work with information in an optimal manner. Designing an individual trajectory of professional development. Own style and methodology of educational activities. The ability for effective independent work. Obtaining the necessary complex of knowledge, skills (competencies) in the optimal

mode Providing a targeted phased, continuous building up of professionalism, starting from the period of study at the university. Perception of the process and learning outcomes from a position of professional significance.

Effectively Reflective Block: Introspection, self-assessment of the effectiveness of educational activities. Permanent educational activities Introspection, self-assessment of the effectiveness of the process of professional development. Awareness of the essence and logic of professional development Self-analysis of personal development with a focus on the future profession. Awareness of self as a subject of personal, professional self-development.

Method

This work refers to the state of the art of what various authors have contributed with the results of research carried out in the fields of education and psychology, of advances in the practice of professional corporate learning, as well as the applications of the use of electronic networks, and network-based tools and service systems, as is the usual practice of most professionals.

The aspects that were considered relevant in the formation of an ICT and that could be useful for evaluating application experiences managed in the framework of a virtual environment were selected, as well as deriving their possibilities of use to the institutional context in which they want to apply. The aspects selected for their importance in optimizing the instructional process are: those referring to a change in the pedagogical conception, technological concretion, forms of communication and interaction, as well as the forms of evaluation that are more consistent with the learning results.

Innovation is a concept but also a process that occurs in the daily life of every school. Every teacher at any time in their professional career has tried to put into practice some ideas, some new methodology or procedure. Many teachers in our country present educational innovation projects that are financed with their respective autonomous communities. In a study commissioned by the Educational Research and Documentation Center (CIDE), we analyzed the situation of educational innovation in the US and found that a large number of teachers and schools were developing an innovation project. In this research we sent questionnaires to professors who were participating in innovation projects, as well as to external agents (inspectors, advisers, counselors); We carried out 16 discussion groups in different autonomous communities in the US, and finally, we analyzed eight case studies of the same number of innovation projects. We received 933 questionnaires corresponding to educational innovation projects in centers throughout the US state (Fang, Huanrui, & Mingrui, 2017).

On the other hand, we have been interested in analyzing innovation as a process. As we already know, innovation does not arise in a vacuum. It arises and develops in an educational context that gives meaning and welcomes any new idea, practice, or procedure. The internal context (a type of center, innovative history of the center, characteristics of the school), as well as the context external to the school, influences to explain why some innovations are more successful than others, why some innovations are more sustainable than others.

An important dimension in any innovation project has to do with its origin: how the idea of the project arose, from whom, how it materializes, who participates, to what degree, how well it is received at the center. The origin of any innovation has to do with the existence of problems diagnosed, and that requires a solution, as well as the existence of a critical mass of knowledge developed and that can be applied to the problems identified.

From a process approach, we are interested in knowing the design and development of innovation projects. At this point, it is essential to analyze data about the specific content of the project: objectives, work sequencing, relationship with practice, what evolution they have had,

where they are currently, what teachers who are not participating say, how the group works, distribution of tasks, meetings, internal organization.

Obviously, one of the problems of innovation with technologies has to do with the fact that when deciding the content of the innovation, this is the technologies and not the teaching and learning processes of certain contents or competences. In this regard, Johnson (2016) states that the chances of success in introducing innovative content related to technologies depend on what he calls distance and dependence. Distance refers to three dimensions: distance from school culture, that is, the degree to which an innovation approaches or distances it from the dominant values, pedagogical beliefs, and practices in a school; distance from current teaching practices as well as the distance from available technological resources, that is, the amount of new technology, hardware, software, connectivity, accessories, that are needed to carry out an innovation successfully.

Holmes (2017) raises the need for educational innovations to be carried out by learning from the results of research on what has been called the learning sciences. In his article, he highlights some principles that can serve as a basis for the development of educational innovation based on validated knowledge.

What usually happens with technological applications is very varied. In this sense, it should be noted that in practice there are often technological developments of various types, depending on technological evolution, or on the economic resources that the institutions have.

Many still support their educational offerings based on the selection of the most appropriate technology and at the lowest possible cost. In these it can be said that technological means are considered as an end in itself where any type of relationship and interaction is conditioned by the medium (s). In this way, it is not possible to consider a psychopedagogical model in an ICT, nor is there an adequate technological infrastructure, and if there is one, there is an absolute dependence on technology and technologists.

Typical consequences are: the lack of coherence between training objectives and course content, little interaction between members of the virtual community, little didactic interaction of the students with the content, with their peers and with the tutors (cognitive dimension) and little their interrelation in the virtual environment (social dimension).

Other institutions rent a license or have a platform based on free software, in which case they continue to represent a techno-centrist approach. These are based on what has been predominant in face-to-face teaching where it has been considered that the process (teaching - learning) is a transmission of formal and procedurally structured scientific knowledge (logocentrism) transferring the scheme to the virtual models of teaching-learning. The result is an emphasis on the logical treatment and structuring of the contents.

Interaction processes require the development of high-level skills, led by presentation and activities that pose a real challenge for students, such as solving a problem or presenting contradictory information, or the encounter with an unknown reality. Also through material prepared based on questions and answers that lead to a metacognitive analysis of what the student does (self-regulation) or applying principles from which he can draw some conclusions that must be ordered.

As it has been observed, the communication process is not limited to the sending of textual messages but constitutes an integrating element of the elements that make up the instructional process of an ICT. On the other hand, it requires from the members of the virtual community a very particular awareness about the meaning that the interaction acquires. Unlike face-to-face interaction, it adopts a different character in terms of written language that is different from spoken language.

Results

Learning processes have become more complex, and thanks to ICTs there is the possibility of open and flexible collaborative learning, but this requires the creation of a virtual environment that conceptualizes the pedagogical approach to be followed, because from the conception that one has about knowledge and learning, the teaching-learning process system is formed.

It is necessary to have a holistic perspective in the use of complex pedagogical models in ICTs, because both behavioral and constructivist approaches have their place for the development of certain skills. The behavioral model can be defined as the sum of information + methods but the information does not become knowledge until it is internalized. Without a context to relate it to, the student remembers only memorization. Hence, both memorization, skills and active knowledge are important, the intersection of which constitutes the core of learning: problem solving and project management.

An ICT requires the coordination of certain elements that can qualify it as such. It is a space designed, not a mere accumulation of HTML pages, or of presentation of digitized information for the student to capture and reproduce, but a space that allows students and teachers to be producers of knowledge based on the relational nature of knowledge and learning. , in the negotiated character of the meaning and in the significant character of the learning activity.

The success of virtual training actions basically depends on designing quality teaching content, in addition to establishing learning and assessment tasks based on real professional life problems, where the student must apply strategies and make decisions.

The electronic interaction between the instructional elements is one of the vital elements, since it sets in motion the virtuality and flexibility provided by the planning and optimal use of methodological proposals to develop instructional materials, within the framework of comprehensive virtual contexts for students. .

The possibility of interacting is a key point in any knowledge construction process, which is why it is so important to create spaces that allow interaction either through synchronous or asynchronous communication. In *e-learning*, online forums create a favorable environment for the operation of virtual communities. In order for these communities to achieve their objectives, it is necessary that they be structured with clear and precise participation rules, that favor personal communication that help to develop the sense of that learning community, promote exchange relationships and promote collaborative learning, as well as involve the student in tasks that require active participation in the learning discourse.

Following the model of Fang,Huanrui, and Mingrui, (2017), a second condition that influences the success of any innovation project, whether or not with technologies, is the innovation itself that is intended to be carried out, as well as the processes generated from its origin to its implementation. What to say about innovation as the teacher's responsibility? Different authors over the years have contributed their ideas to conceptualize the processes of change in education.

Generally speaking, it seems useful to define innovation as a deliberate, new, specific change that is thought to be more effective in achieving the goals of a system. It seems reasonable to consider that innovations are planned rather than random. The element of novelty can be given by recombination of parts or by a qualitatively different form of what is done.

For Huda et al., (2019), innovation is a broad and at the same time limited term:

Innovation can refer to anything new to an individual within the system, and what is an innovation for one person may not be for another in the same school. Thus, innovation can include not only curricular changes, but also new processes, products, ideas, or even people.

New care procedures, new textbooks, or even a new principal can legitimately be viewed as an educational innovation.

Kerr (2016) also gives us his definition: An innovation is an idea, object, or practice perceived as new by an individual or individuals, which attempts to introduce improvements in relation to desired objectives, which by nature it has a foundation, and it is planned and deliberated.

It is particularly important that the design of ICT impose activities that allow the student to interact with himself through self-regulatory aids, as well as with his peers to support each other in the development of common works.

The activities related to the evaluation process in ICT must be associated with very clear specifications to improve the efficiency of each of the elements involved in the course and which include not only the evaluation of academic performance but also that of the entire instructional system. Based on the position that certain types of adaptive processes are not autonomous entities that provide for the special organization of educational activities, but in reality, they function comprehensively in close interaction and interdependence, we determined their levels of formation comprehensively, integrating their main indicators.

Conclusion

In conclusion, it should be noted that the personality component is systemically important in the content of the adaptive system of professional education of social educators. It is important that the content of professional education of future specialists is not set in advance, but is born in the process of subject-subject interaction. The adaptive education technologies used should reflect the cooperation of subjects, dialogue, the solution of personally significant tasks, free testing of experience. The basis for the implementation of adaptive education technologies is the transition from a monologue to dialogue, from social control to development, from management to self-government on the basis of the reflection of one's activities by a future specialist.

Statements

Technological solutions in personalized learning should improve what a teacher is trying to do. In the classroom, there are multiple dynamics at work. There are the relationships between the students and their classmates, between the students and the teachers, between the students and the study plan, between the teachers and the study plan, between the students and the content, between the teachers and the content and therefore relationships will also be established between the digital product and all these people and elements.

If the digital product disrupts these dynamics, it will fail. It is presumptuous to assume otherwise. We cannot go into the classroom, a complex and valuable environment, and expect everything to undergo technology. When we create a product, we must understand these relationships and meet their needs. The question is: what kind of teaching practice will improve the product? Because of the environment doesn't improve, it doesn't belong in the classroom.

When information and communication technologies are introduced simply because they want to, there is often no real advantage added to the classroom. Technology should only be introduced if it provides exponential benefits to the people involved.

In many cases, criticism of personalized learning comes from a lack of understanding or product failure. Adaptive learning is not simply about adapting to the student's itinerary; True adaptive learning solutions are tailored to the curriculum, culture, and country in which they are applied.

A robust solution has to take into account different learning styles and cultural differences and create products that are tailored to the specific educational needs of each country.

Additionally, online schools and educational programs that promote personalized learning have also become the subject of criticism, debate, and controversy. Many for-profit virtual schools and online university programs, for example, have been accused of offering low-quality educational experiences to students, taking advantage of these or public programs, and using the popularity of concepts such as personalized learning to promote programs.

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