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Analysis of Technological Innovation Tools to Improve Educational Performance in Infants With Attention Deficit Hyperactivity Disorder in Tijuana, Mexico

Brenda Gabriela Alarcón Sandoval[1], Carlos Valencia De Cordova[2], Osiris Muro Arcadia[3], Gustavo López Badilla[4], Marisela Pérez[5], Ana Karen Villaseñor Aleman[6], ENF ECI Ángel Antonio Colorado Rodríguez[7], Elisa Sarahí Contreras Tapia[8], Rosa María Duque Sevilla[9]

[1,2,3,4,5,6]Departamento de Tecnología, Secundaria Federal Emiliano Zapata No. 32, Valle Las Palmas, Campus Tijuana, Baja California, Mexico.

[7,8]Departamento de Ciencias de la Salud, Universidad Autonoma de Durando, Campus Tijuana, Baja California, Mexico.

[9]Departamento de Ingeniería Industrial, Tecnológico Nacional de México, Instituto Tecnologico de Tijuana, Tijuana, Baja California, México.

Abstract – The risks of behavior, anxiety, depression and use and abuse of medical substances to have control in infants with attention deficit hyperactivity disorder (ADHD) are of great importance, because based on efficient medical treatment and the use of technological innovation tools for elementary level educational activities in ten educational institutions located in Tijuana. This city is a border area with the state of California, which is one of the relevant states of the United States. The investigation consisted of three steps, being the first being the analysis of the educative yielding of children in schools of the aforementioned school level, evaluating the development of activities in periods of time, as well as the objectives achieved from said activities without the use of tools. of technological innovation with industrial engineering techniques. The second part consisted of an analysis of the type of ADHD symptom in one hundred primary school students from the educational institutions that allowed the research to be carried out, as part of the mental health of the students evaluated. The third part included an evaluation of the use of technological innovation tools with industrial engineering methods, to increase educational performance in the evaluated infants. This investigation was made from 2022 to 2023.

Keywords: Technological innovation, mental health, ADHD, industrial engineering methods, primary educational institutions.

1.INTRODUCTION

The constant evolution of teaching-learning processes in educational activities has led to the evaluation of educational innovation tools, where strategies with digital technology are applied, so it is necessary to be constantly updated on the relevant topic that is education (Polanczyk et al, 2014; Coelho et al, 2019). The use of the Internet appropriately has encouraged the use of information and communication technology (ICT) tools, where methods and techniques of educational innovation have been developed with specialized tools (Kirova et al, 2019). Based on what was mentioned above, it has been observed that students from primary school to university level are mostly interested in learning in educational institutions with dynamic, virtual and visual actions. In addition to this, according to the World Health Organization (WHO) worldwide and the Secretaria de Salud y Asistencia (SSA) in the Mexican Republic, it mentions that

the rates of students from initial stage level to university with the health symptom called disorder due to attention deficit hyperactivity disorder (ADHD), have increased in recent years (Twisk, 2021). This is part of certain actions that occur in families today, where in several homes in our country and around the world, due to the need for both parents to work, they stop caring for the children. In this way, children look for an action to be able to express their dissatisfaction with this critical situation and act inappropriately, such as not following rules in schools, and are part of complicated situations that sometimes generate some type of destabilization in the classrooms. class, being necessary to use learning strategies in a visual, virtual and dynamic way (Steiner et al, 2016; Imeraj et al, 2013). The three principals specialized strategic in the education activities mentioned above, are illustrated in figure 1. In this investigation are evaluated the correlation of the use innovative education tools and the presence of ADHD in ten high schools located in the Tijuana, Baja California, México.

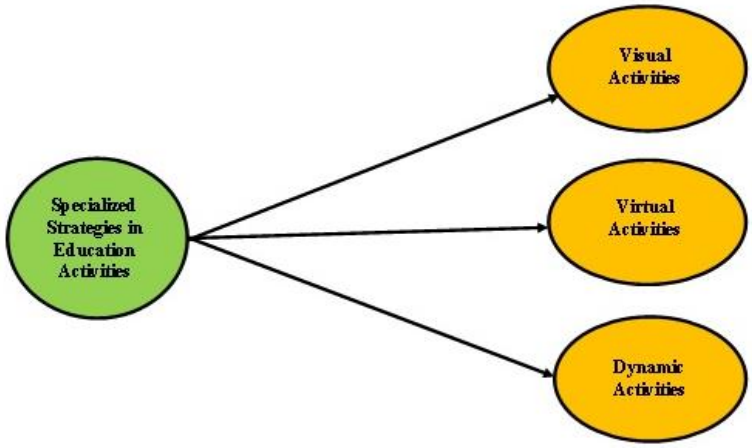

Fig -1: Specialized strategies applied in education activities.
Source. Analysis of investigation

1.1 Educational Activities

Educational activities are an essential part of the training of students at various educational levels (from kindergarten to postgraduate level), which consist of the development of teaching (teaching), student (learning) and extracurricular activities (at the students' home, such as homework or science work), as illustrated in figure 2 (Imeraj et al, 2016). Based on the knowledge acquired in the completion of the teaching career, during the preparation of teachers; and the constant preparation of teachers, as part of their specialization and teaching experience, is important to be able to generate the teaching-learning process in an optimal way. In addition, teachers must learn to use technological tools such as the Internet, electronic means of communication and some basic computer programs such as Word, Excel and Power Point and any other required for the development of educational activities (Willcutt, 2012).

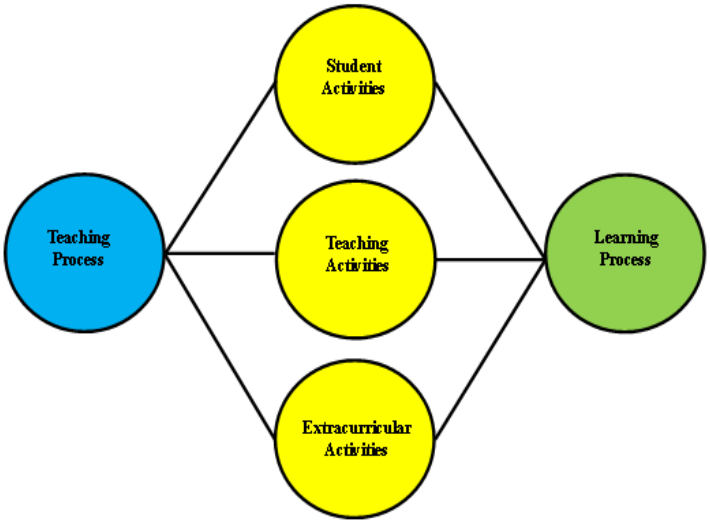

Fig -2:Types of main educative activities
Source. Analysis of investigation

This is to increase the quality of the teaching-learning process, and with it the educational performance of the students that they require to improve their comprehensive development and have high levels of competitiveness (WMA, 2013; Faraone et al, 2015).

1.2 Technological Innovations

They are of great relevance for teachers to develop their teaching-learning activities efficiently, where the tools of information and communication technologies are focused; generating high-level academic performance and thus obtaining students who generate optimal competitiveness (Owens et al, 2018). Technological tools are very useful in educational activities, where they can be considered as educational resources in any educational institution, to add value to the teaching-learning processes. There is a great diversity of technological tools that can be used by teachers and be able to make their actions as teachers more efficient. These technological tools are promoted by extracurricular courses for teachers, where there are bachelor's degrees, specialties, master's degrees and doctorates to learn how to use them. The main actions to take advantage of technological tools are the development of new technologies, combination of new and current technologies and obtaining new knowledge shown in Figure 3 (Zendarski et al, 2022).

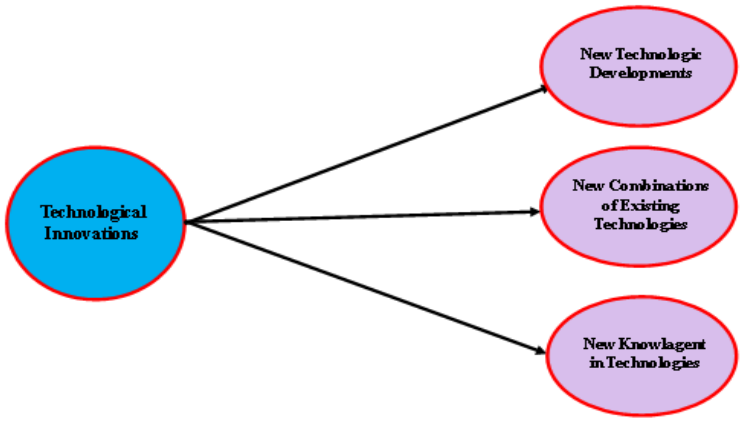

Fig -3:Types of technological innovations in educative activities
Source. Analysis of investigation

The most essential technological tools are listed and explained below in Table 1:

Table -1: Main technological tools utilized in the education activities

Type of technological tool for educative activities	Activiti=y
Learning management systems	Are used to manage, organize and offer online courses. This is relevant to professors because can organize in computer platforms the class actions to their students, being important in meteorological or health critical events
Social Networks	Are utilized to elaborate special or certain type of communications, being used by a lot professors and students, to send educative instructions as homework's or partial and final educative works from students to professors and professors can send to students some presentation to class activities. Also, are utilized to organize the class activities.
Specialized platforms	Are very relevant in the educative activities to expose instructions, homework's and interesting information to an optimal educative action.
Blogs	Are very important in the educative actions to the creation and publish some contents for thematic relevant in scholar activities.

1.3 Attention Deficit Disorder and Hyperactivity (ADDH)

This a health symptom that affects to millions of persons as children's students from maternal, preschooler and elementary levels, and also to teenagers' students at medium high school, high school and universities in the world, presenting some irrelevant actions as are observed in figure 4 (Staff et al, 2020; APA, 2013), and being the more frequently actions in this type of persons. Another bad action is the lack of coexistence with their classmates in the classrooms of educational institutions and with their family and friends (Stone et al, 2015; Staff et al, 2021).

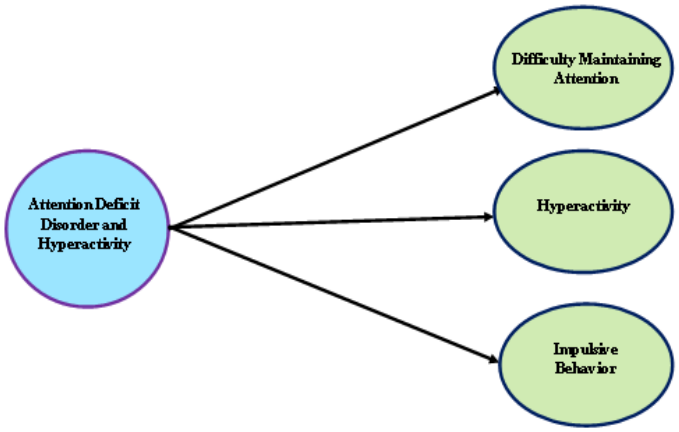

Fig -4:Essential actions in teenagers by the ADDH symptom
Source: Analysis of investigation

This investigation is based only in teenagers of elementary level in ten schools of the Tijuana city, where some experts in this relevant topic consider that one of principal cause is the lack of attention of fathers and lack of emotional support, which they look for in teachers and educative institutions.

2. METHODOLOGY

This investigation is very interesting because can collected important information and be made in three steps, which are explained now:

a. Evaluation of educative levels of 100 students of the ten elementary schools.

b. Analysis of ADHD symptom in some elementary students, being evaluated 25 by each 100 students of the elementary schools analyzed.

c. Evaluation of technological tools used to scholar activities to improve the educative yielding of the students evaluated.

3. RESULTS

The relevant investigation was made to obtain the essential causes of the ADHD symptoms in some students evaluated and correlate the use of technological tools in educative schools and the educative yielding of students, which are explained at detail in the next sections.

3.1 Analysis of Educative Yielding of Students

This part of the scientific study was made to evaluate 10 students of six grade of the ten elementary schools and was represented in two tables the educative yielding without use of the technological tools for scholas actions in table 1 and with the utilize of technological tools correlated with the educative yielding in table 2. This relevant analysis was interesting to determine the new strategies evaluated to increase the educative yielding of the students. In both tables are represented the students as the first students average of ten

students of six grade of elementary schools, which permitted this scientific study. This was illustrated in the percentage of each school of ten students evaluated. The educative yielding was analyzed as the responsibility, attitude and correct information of the scholar activities in the classroom of the students evaluated.

Table -1: Evaluation of average percentage of educative yielding of students evaluated before apply the technological tools for educative activities(2023)

Schools / Students	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10
1-10	45	58	65	60	62	62	56	59	66	60
2-10	56	67	69	63	67	67	60	62	59	63
3-10	67	64	65	69	66	66	63	64	60	61
4-10	68	68	64	68	62	68	58	61	66	59
5-10	69	66	62	62	63	62	53	60	67	66
6-10	67	69	59	56	66	57	49	64	64	64
7-10	64	67	60	59	63	49	59	59	62	63
8-10	66	66	67	63	68	58	63	57	60	65
9-10	63	63	66	60	59	60	60	66	59	66
10-10	65	58	63	63	60	55	62	69	63	69

Table -2: Evaluation of average percentage of educative yielding of students evaluated after apply the technological tools for educative activities(2023)

Schools / Students	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8		SC9	SC10
1-10	88	89	88	89	90	95	95	90		92	90
2-10	86	94	86	90	92	93	94	92		88	91
3-10	89	92	90	93	93	90	93	94		85	93
4-10	92	90	93	90	91	91	93	90		89	89
5-10	90	94	90	92	90	88	90	91		90	87
6-10	86	91	94	91	89	86	88	89		88	89
7-10	88	88	92	94	88	89	89	88		94	93
8-10	85	87	95	93	87	88	92	90		93	90

9-10	89	89	90	88	93	90	90	93		90	92
10-10	90	90	92	87	94	92	91	90		92	94

Tables 1 and 2 illustrates the percentage levels of educative yielding of the 100 students of ten educative schools evaluated, where was observed that the percentage was increased with the use of technological tools to scholar actions, mentioning that the principal technological tools utilized in this investigation were the blogs, social networks from teachers to students and specialized platforms to teachers to expose the necessary information to the educative activities in this scientific study. Is necessary mention that the educative schools are in zones of the Tijuana city with good infrastructure about the technological tools, and is evaluated this investigation to other schools of this city and other levels of educative activities as junior kinder garden, junior high schools, high schools and with the possibility to universities with poor infrastructure and new specialized strategies.

3.2 Correlation Analysis of ADHD Symptom and Educative Yielding of in Students

With the results of the last section was made a correlation analysis of the educative yielding of the students evaluated and the actions of the health symptoms presented of the ADHD, to determine the principal causes and consequences of this relevant health symptom, which occurs with a lot frequency in child's and teenagers specially. This is presented in figure 5, analyzed by colors, where dark blue color represented the difficult to concentrate in the classrooms of the scholar activities, followed by the hyperactivity with the orange color action with students that is lift a lot times of this desk and talk a lot times. Then, was follow the impulsive behavior where students with ADHD, which were very impatient and want to hit to his classmates with gray color and was observed with the next color as yellow color the lack of coexistent of students with the ADHD with his classmates, and finally the light blue color, representing the actions without think of students with ADHD, indicating that students make things without their adequate conscience and can generates bad actions.

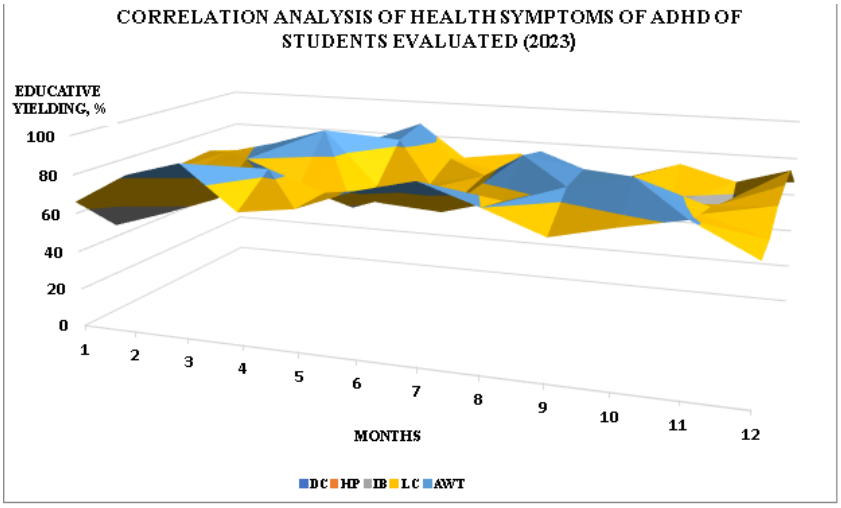

Fig -5:Correlation analysis of educative yielding and health symptoms of AHDH of students evaluated as of ten educative institutions (2023).

Difficult Concentration (DC), Hyperactivity (HP), Impulsive Behavior (IB), Lack of Coexistence (LC), Act Without Think (AWT)

3.3 Evaluation of Relation of Use of Technological Tools and Educative Yielding

This section of the investigation was made to determine the principal characteristic of the technological tools utilized in the educative actions and the level of achievement with the use of the students evaluated with respect to the use of technological tools (TT) in school activities in classrooms, in the educational institutions where the research was made. In table 3 is showed the level of achievement of the use of the main technological tools evaluated in this study.

Table -3: Analysis of educative yielding by school for the use of technological tools to scholar activities (2023)

Technological Tools	Social Networks		Specialized Platforms		Blogs	
Schools Utilized TT	WHTT	WTT	WHTT	WTT	WHTT	WTT
1	67	89	68	95	70	90
2	68	94	70	93	72	94
3	74	93	76	93	70	90
4	70	95	74	92	73	92
5	73	90	70	90	75	93
6	70	92	74	88	76	93
7	68	88	72	89	73	90
8	70	90	76	92	78	93
9	70	92	78	91	75	95
10	67	95	76	90	75	92

With Technological Tools (WTT), Without Technological Tools (WHTT)

Table 3 shows the educative yielding by school and technological tool, where was observed that the use of the TT in the schools evaluated with the students without ADHD and with ADHD, being relevant to determine the scholar situation with the utilize of the technological tools and illustrating that are necessary in the educative activities.

3.4 Comparative Analysis of Educative Yielding of Students

In this scientific study, was made a comparative analysis of the students evaluated between the use of technological tools and not use the TT as an example of this investigation, where was observed that with the use of the technological tools, the educative yielding was increasing, compared with the no use of TT, observing that was increased the school achievement of the students of the educational institutions evaluated. This analysis is presented in table 4 with a specialized example of ten students of a educational institution evaluated (five students without SDHD and fiver students with AHDH), observing that in both

cases the educative yielding was improved, when was utilized the TT as a dynamic scholar activity about the use of special platforms with the CANVAS tool, which have dynamic functions and figures to understand with easy form to students' users. This experimental process was made in schools with efficacy in its infrastructure, and not was took pictures for the agreement with schools to respect private events in schools in child's. This experimental analysis improved the educative yielding of both type students without ADHD and with ADHD.

Table -4: Comparative analysis of use or no use of technological tools in scholar activities (2023)

Technological Tools	Not Use of CANVA Software		Use of CANVA Software	
Students	SWOADHD	SWADHD	SWOADHD	SWADHD
1	77	46	94	79
2	79	48	96	82
3	82	50	97	80
4	80	52	95	77
5	79	39	94	83

SWADHD. Student With AHDH health Symptoms, SWOADHD. Student Without AHDH health Symptoms

Table 4 shows an experimental process about the use or not use the CANVA software, where was illustrated that both type of students, was improved his educative yielding, being used this CANVA software because is free with basic functions, to the teaching-learning process in the ten scholar institutions evaluated.

4. CONCLUSIONS

This investigation was relevant as a principle of the use technological tools in educative activities, where are students of diverse levels with the ADHD, which are increased in the educative institutions of the Tijuana city and others places of the world, by deficiency of families, because need world as mother and father and sometimes teenagers as students of diverse levels of educative activities. This was recommended, because students with ADHD, because use more visual and dynamic actions to learn about any thematic in the schools of diverse educative levels in our country and other places in the world. With the scientific study, was obtained relevant information to support students with ADHD and have efficient scholar courses in the educative institutions, as is observed in the schools evaluated of the Tijuana city.

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