Virtual Companion: Expert System to Improve Post-Pandemic Emotional Stability in Students, Peru

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Abstrat

Emotional stability has become an internal struggle that we all have, and also a very important factor in the development of learning. Emotional stability comes from the inner spirit that we have and we can only acquire it in two places, which is the family and friends or external people, since this factor is forged with self-esteem and self-confidence, in the course of time, it has been observed how students have various problems, and largely influences their academic performance or in the development of the tasks designated by teachers as well as in household chores, this leads to social isolation, which leads to lack of self-confidence and therefore causing instability in their emotions. Dialogue is a very important means by which we find answers to our doubts and comfort to loneliness, we are aware that being alone for a while helps us to know ourselves, but if not, we can sink into depression, stress or anxiety that could have many consequences. (Porras Jimenez, 2020) is why in the face of social isolation this has worsened, affecting their academic performance, as well as their personal life. In the face of all adversities, the world continues to advance, technology evolves day by day, (Castillo Saenz & Montoya Bello, 2021) artificial intelligence can become an essential use for selection processes. On the other hand remote symptom tracking and monitoring can be systematized, as institutions and professionals generate new, service delivery and technological advances continue to emerge, such as the case of the collaboration between Google X and Biogen collaborating with sensors and data analysis and the dreamMS project in Switzerland, which involves the identification of digital biomarkers for multiple sclerosis using smartphones (Khannan & Jones, 2021). General models have been advanced for the integration of telehealth and remote patient monitoring (RPM) based on reflections of the pandemic with proposals for

"augmented continuous connected care" driven by human inputs. It should be noted that companies with a large amount of redundancies, it is problematic to use the traditional selection method as every process requires time to choose a candidate, while having a tool such as artificial intelligence as a complement can be very useful and necessary to optimize time, money and mainly eliminate human bias. Knowing that artificial intelligence can detect various types of changes or alterations, it can also detect an emotional alteration and provide moral support, when a person is not emotionally stable, usually negative thoughts and ideas come to mind, artificial intelligence can detect such problems and provide phrases or tips in order to motivate the user, and in turn help with simpler tasks in daily work. Dialogue is one of the most effective ways to prevent any emotional alteration, the human being needs communication to be able to maintain a balanced mind and once he performs his daily activities (Vivanco, et al., 2021) seeks the emotional well-being of the staff, so that they are psychologically fit and can perform their professional work that will be for the benefit of the population. Despite the little interest of the responsible institutions, he saw how the health area was affected in this pandemic.

Keyword: Emotional stability, artificial inteligence, communication.

Introduction

Globally, the pandemic leaves a discouraging environment, causing great disasters, both economically, socially, culturally and especially in health, generating alterations in socioemotional behavior. In the current circumstances, it can be frequent that most of the student population manifests anxiety, fear, sadness, anger and/or impatience. Thus, (Ozamiz, et al, 2020) argue that confinement brings psychological problems such as stress, anxiety and depression, being anxiety the one that has had more incidence in the general population and in those actors expendable for the COVID-19 struggle.

Currently, the use of Animated Conversational Agents has been growing, since they are a very useful and easy to use tool for certain tasks. They can act as guides, teachers, helpers, and can provide assistance in the search for information on a topic, and can even hold a conversation on any specific topic. Agents are entities capable of perceiving their environment, which can process what they perceive and have a reaction, i.e. a response or act in their environment in a rational manner (Dominguez, 2011).

Chieng (2020), in his project indicates that anxiety and depression are the most frequent affective disorders. For this reason, he conceptualizes a digital solution to initially identify the symptoms of anxiety or depression and detect in a timely manner what level of disorder is being suffered, using as a basis the SRQ, K-10 KESSLER and PHQ9 questionnaires. The diagnosis would be made through a conversation with a virtual assistant (Chatbot), with the aim of reducing the symptoms of these disorders and mitigating the related negative effects. It gives us to know why the Chatbot is going to be the solution and support tool for the person who needs to measure the level of anxiety or depression, and what procedure would be more viable to cope with these disorders.

Ayala (2021), in her project entitled "Telepsychiatry: a revolution of mental health in times of pandemic" tells us that mental health today is facing new challenges. In recent years, the Internet has become the space for research where health care and health promotion processes can be developed in order to analyze and evaluate new knowledge. In the current context, it is of crucial importance that health professionals are aware of this new method.

Dialogue is a very important means by which we find answers to our doubts and comfort to loneliness, we are aware that being alone for a while helps us to know ourselves, but if not, we can sink into depression, stress or anxiety that could have many consequences. (Porras, 2020) that is why in the face of social isolation this has worsened, affecting their academic performance, as well as their personal life. In the face of all adversities, the world continues to advance, technology evolves day by day, (Castillo & Montoya, 2021) artificial intelligence can become an essential use for selection processes. On the other hand remote symptom tracking and monitoring can be systematized, as institutions and professionals generate new, service provision and technological advances continue to emerge, such as the case of the collaboration between Google X and Biogen collaborating with sensors and data analysis and the dreamMS project in Switzerland, which involves the identification of digital biomarkers for multiple sclerosis using smartphones (Khannan & Jones, 2021).

Therefore, the general objective is to Implement a virtual companion expert system to improve post-pandemic emotional stability in students of the I.E. Julio Armando Ruíz Vásquez, and the specific objectives, (1) Diagnose the current emotional stability in students of the I.E. Julio Armando Ruiz Vásquez., (2) Design the expert system "virtual companion" to improve post-pandemic emotional stability in students of the I.E. Julio Armando Ruíz Vázquez. (3) To carry out the software tests to the expert system "virtual companion" to evaluate the emotional stability in students of the I.E. Julio Armando Ruiz Vazquez.

Methods

CommonKads Method, is a methodology used for the construction and analysis of Knowledge-Based Systems analogous to the methods used in Engineering (Schreiber, Wielinga and Van de Velde, 1999). It presents six models by Iglesias (1998), which are described below, applied in the development of a Multi-Agent System for English language learning. The CommonKADS methodology covers the entire software development cycle of Knowledge-Based Systems (KBS). It does this through a number of interrelated models that capture the main features of the system and its environment. CommonKADS defines models that represent different perspectives of organizational processes.

The BCS development process consists of collecting information based on a set of templates for the models. CommonKADS defines six models framed in three levels (Vargas, 2011)
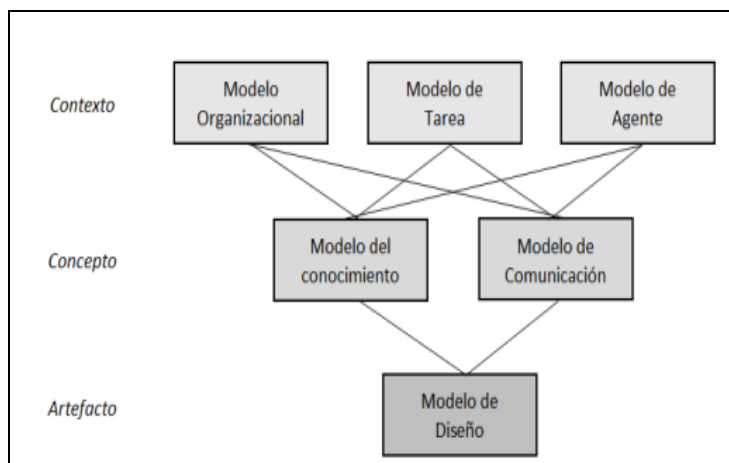

Figure 1. *Levels of the CommonKads method*

Results

Chart 1. *Description of the process from the point of view of the tasks in which it is composed and its main characteristics.*

Organization Model			**Template OM-3. Aspects to consider**			
N°	**TASK**	**REALIZED BY**	**WHERE?**	**KNOWLEDGE ASSET**	**KNOWLEDGE INTENSIVE?**	**IMPORTANCE**
T-01	Identify the academic performance of students.	School principal Vice principal of school. Teachers.	Pedagogical sub-directorate.	Student notes	Yes	4
T-02	Analyze the causes of low academic performance.	School principal Vice principal of school. Teachers.	Pedagogical sub-directorate.	Current situation of the pandemic and confinement.	Yes	4
T-03	Propose solution measures.	School principal Vice principal of school. Teachers.	Pedagogical sub-directorate	Current situation of the pandemic and confinement.	Yes	4
T-04	Define the profile of the required psychologist.	School principal Vice principal of school.	Pedagogical sub-directorate	Contracting parameters according to the requirements requested.	Yes	5
T-05	Find quality psychologists.	School principal Vice principal of school.	Pedagogical sub-directorate	Interviews	Yes	4
T-06	Apply psychological tests to students.	Psychologists Students	Coordination of Psychopedagogy	Psychological test design.	Yes	5
T-07	Evaluate student behavior.	Psychologists Teachers Parents.	Coordination of Psychopedagogy	Psychological test design.	Yes	3
T-08	Determining the Mental State of Students.	Psychologists	Coordination of Psychopedagogy	Mood Rating Scale.	Yes	4
T-09	Inform the institution of the situation.	Psychologists School principal Vice principal of school.	Coordination of Psychopedagogy	Report with the analysis of the results.	Yes	2
T-10	Schedule sessions with students outside of class hours.	Psychologists School principal Vice principal of school. Teachers Students	Coordination of Psychopedagogy	Psychological virtual scheduled sessions.	Yes	5
T-11	Reassess students.	Psychologists	Coordination of Psychopedagogy	Psychological test design	Yes	4
T-12	Inform the institution of the student's progress.	Psychologists	Coordination of Psychopedagogy	Report with analysis of test results.	Yes	4

Chart 2. *Descripción refinada de las tareas dentro del proceso objetivo.*

| Task		T-01, Identify the academic performance of students
Organization		Pedagogical sub-directorate
Objective and Value		This task is necessary to identify that there are problems in the academic performance of the students.
Dependency and Flow	Preceding tasks	--
	Following tasks	Identify the causes of low academic performance.
Object handling	Objects entering	Student grade report.
	Objects coming out	Student attitude and aptitude.
	Internal objects	Competences established by the educational institution.
	Frequency and duration	See Annex 6.
Time and Control	Grip	The teacher obtains the student's evaluation, measures how close the student's competencies are to those established by the educational institution.
	Restrictions and conditions	Bimonthly evaluations Know the academic performance of students Established competencies
Agents		School principal Vice principal of school. Teachers
Knowledge and Skills		Have the ability to identify, observe, classify, analyze and synthesize the student's academic performance.
Resources		Time: Time used in the analysis of the academic performance of the students. Equipment: The agents use their computers to carry out the task. Economic budget: The agents have a monthly payment by contract with the educational institution.
Quality and Execution		Feedback must be received from the agents, in order to establish if a correct analysis of the academic performance of the students was made. It is necessary to emphasize that the agents involved in the execution of the task have an experience that allows them to better identify the academic performance of the students.
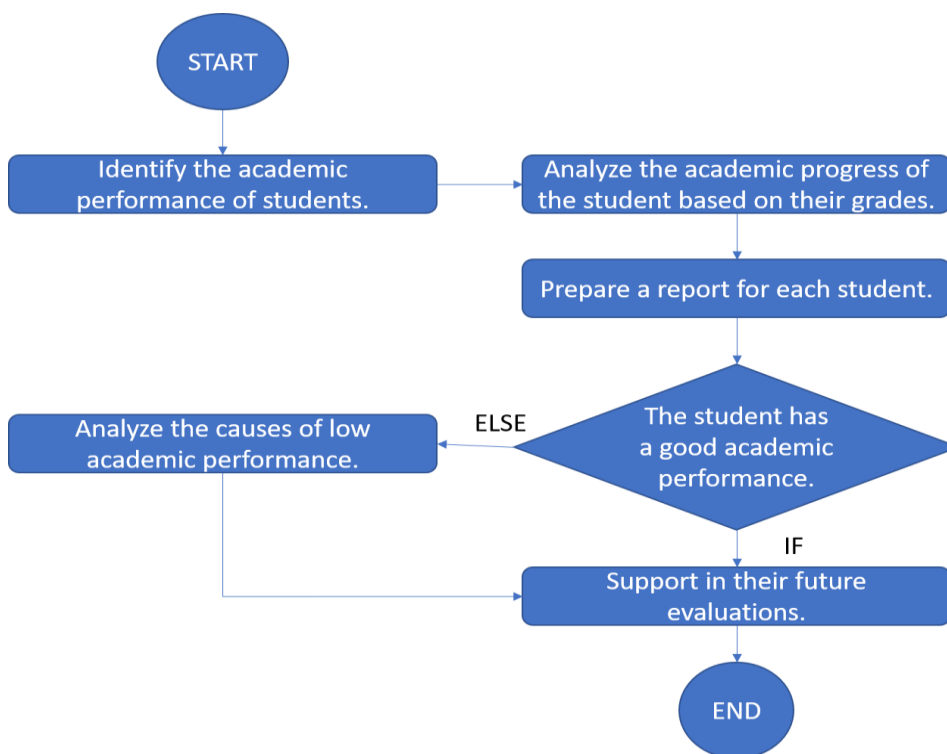
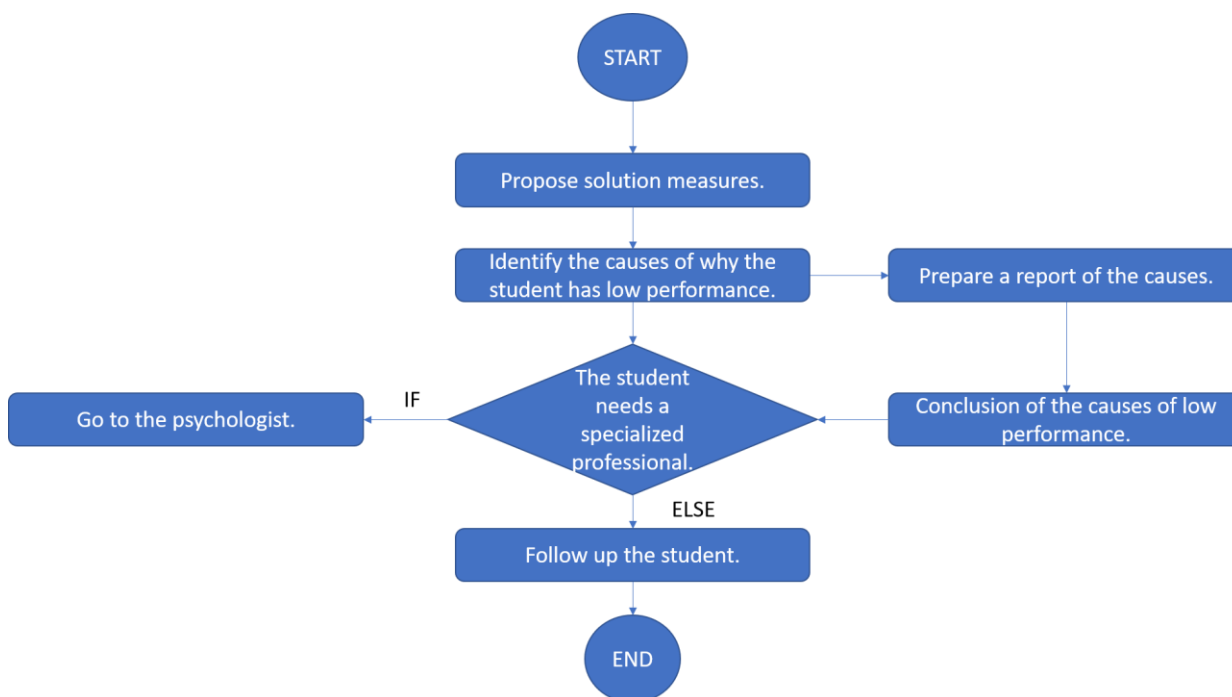**Figure 2.** *Diagrama de flujo del T-01*

Figure 3. *T-03 Flowchart*

Discussion

In the current circumstances, it may be common for the majority of the student population to manifest anxiety, fear, sadness, anger and/or impatience. Thus, (Ozamiz, et al., 2020) maintain that confinement causes psychological problems such as stress, anxiety and depression, anxiety being the one that has had the highest incidence in the general population and in those dispensable actors in the fight against COVID-19. 19. They also point out that the

social crisis has indisputably been expressed in a social alteration of anxiety levels, where there are those who, on the one hand, assume their position of highly vulnerable and who have already experienced the feeling of anxiety in other circumstances; and on the other, those who, as a result of confinement and uncertainty, have just experienced anxiety, the effects of the preventive and emergency health measures implemented by the government have cascading effects on the lives of students, teachers, parents and of society as a whole, since this pandemic has not only caused damage to their health, but has also altered their socio-emotional behaviors. According to the United Nations World Organization, 51.2% of girls, boys and adolescents in urban areas of LATAM live in homes with some type of housing precariousness (CEPAL, 2020).

According to Leyva (2019), in EXPANSIÓN magazine, the article "this virtual assistant helps treat mental illnesses" where he mentions that more than 650,000,000 people in the world suffer from mental illness, in turn in Ayala's research (2021), I know that mental health, today, faces new challenges, such as reinventing itself and constantly renewing the methods to access and care for patients. According to Nadal, (2017), he made the article 'chatbots' that help reduce your anxiety, mentioning the importance of virtual assistants that contribute to mitigating emotional and mental problems, in turn the acceptance of psychologists towards these assistants. An agent is an executor of a task. It can be human, software or any other entity capable of performing a task. This model describes the powers, characteristics, authority and restrictions to act of the agents.

V. Conclusions

− It was possible to diagnose the current emotional stability in the students of the I.E. Julio Armando Ruiz Vasquez.
− The "virtual companion" expert system was designed based on the CommonKads methodology to improve post-pandemic emotional stability in students of the I.E. Julio Armando Ruiz Vazquez.
− The "virtual companion" expert system was developed using languages such as html, php, javascript and css to improve post-pandemic emotional stability in I.E. Julio Armando Ruiz Vazquez.
− Software tests were carried out on the "virtual companion" expert system to evaluate emotional stability in students of the I.E. Julio Armando Ruiz Vázquez.

References

Castillo, R., & Montoya, M. (2021). Impacto de la inteligencia artificial en los procesos de selección en recursos humanos internacionales. Lima: Universidad San Ignacio de Loyola. http://repositorio.usil.edu.pe/handle/USIL/11230

Mitchell, A. (2021). Posibilidades de tecnología de colaboración a partir de la colaboración virtual en tiempos de COVID-19 y estrategias posteriores a la pandemia", Tecnologías de la información y personas, vol. antes de la impresión No. antes de la impresión. https://doi.org/10.1108/ITP-01-2021-0003

Khanna A, Jones GB. (2021). Envisioning Post-pandemic Digital Neurological, Psychiatric and Mental Health Care. Front Digit Health. Dec 21;3:803315. doi: 10.3389/fdgth.2021.803315. PMID: 34993505; PMCID: PMC8724196

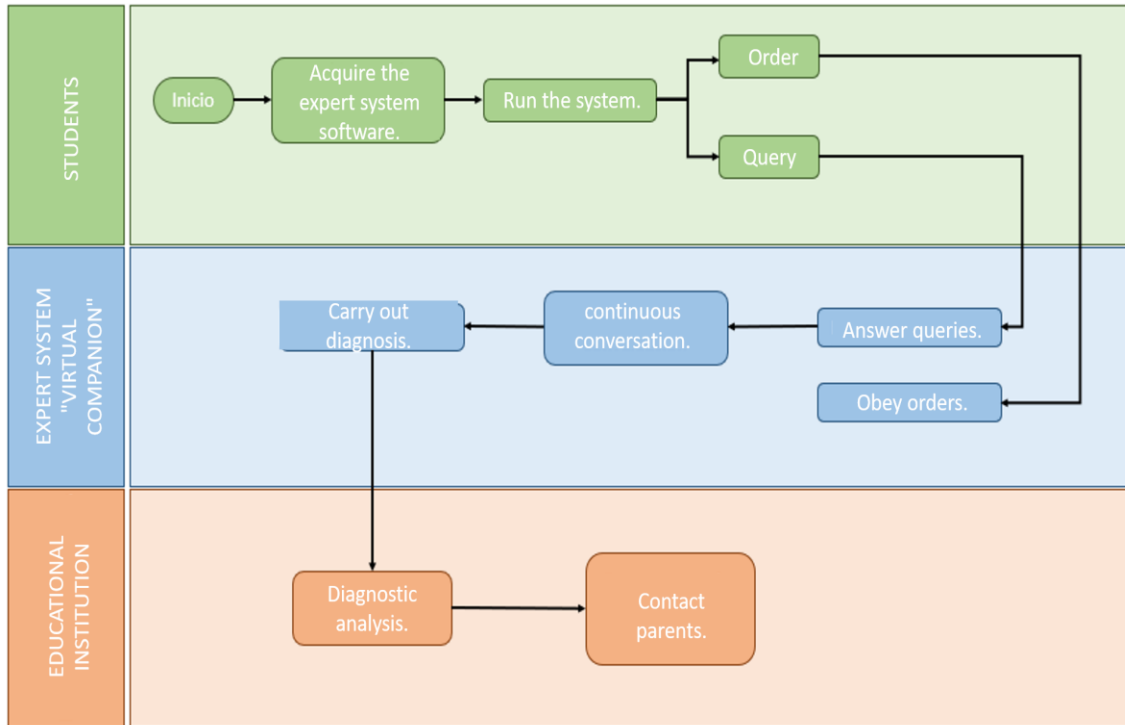Porras, L. F. (2020). Diseño de aplicativo móvil para evitar el deterioro de la salud mental por

el aislamiento social motivado por el Covid-19 en jóvenes de 20 a 25 años. Lima: Universidad San Ignacio de Loyola. http://repositorio.usil.edu.pe/handle/USIL/10895

Vivanco, R., Yarleque, C., & Pajuelo, C. (2021). Diseño de infografías sobre salud mental para prevenir el deterioro emocional del personal de salud de primera línea debido al alto índice de pacientes con Covid-19 en los hospitales públicos del Minsa.

Ayala, N. (2021). La telesiquiatria: una revolucion de la salud mental en tiempos de pandemia. Tesis de pregrado, Universisdad Nacional De Asuncion , San Lorenzo.

B12 España. (30 de Sepiembre de 2019). ¿Qué es la Ingeniería del Conocimiento? Recuperado de B12.Tech4Business: https://agenciab12.com/noticia/que-es-ingenieria-conocimiento.

Badaro, S., Ibañez, L. J., & Aguero , M. J. (2013). Sistemas Expertos: Fundamentos, Metodologías y Aplicaciones. Universidad de Palermo, Facultad de Ingeniería., 349-364.

Barrera, L. (2012). Fundamentos históricos y filosóficos de la Inteligencia Artificial. Revista Científica de Investigación e Innovación para el Desarrollo Social, 87-92.

Bueno, D. (2021). Afores. La pandemia de COVID-19 ha alterado profundamente la dinámica educativa, afectando los estados emocionales de los estudiantes y, en consecuencia, su aprendizaje y bienestar.: https://annafores.wordpress.com/2021/04/05/la-pandemia-de-covid-19-ha-alterado-pr ofundamente-la-dinamica-educativa-afectando-los-estados-emocionales-de-los-estudi antes-y-en-consecuencia-su-aprendizaje-y-bienestar-para-hacer-frente-a-esta-s/

CEPAL. (2020). Recuperado de https://repositorio.cepal.org/bitstream/handle/11362/45904/1/S2000510_es.pdf

Chieng, A. (2020). Evaluacion de transtornos mentales de ansiedad y depresion via chatbot. Tesis de pregrado, Universidad de Lima, Lima. Recuperado de https://repositorio.ulima.edu.pe/bitstream/handle/20.500.12724/13253/Chieng_Cueva _Ana_Isabel.pdf?sequence=1&isAllowed=y

Coca, G., & Angel S., C. (2009). Metodología para la simulación de expresiones no verbales de una recepcionista virtual. ITCM.

Cortez, A., Vega, H., & Pariona, J. (2009). Procesamiento de lenguaje natural. Revista de Ingeniería de Sistemas e Informática, 6. Recuperado de https://revistas.gnbit.net/index.php/sistem/article/view/5923/5121

Domínguez, J. (2011). Diseño de un asistente virtual con dialogo emocional. Tesis de Pregrado, Instituto tecnológico de CD. Madero, Madero, México.

Farelos, J. (s.f.). Estructura de los Sistemas Expertos. Recuperado de file:///C:/Users/book/Downloads/Estructura%20de%20los%20Sistemas%20Expertos %20.pdf

Gómez, G. (s.f.). Vision Computacional. Puebla, Mexico.

Hernández, N. L., & Flórez, A. S. (2014). Computación en la nube. Recuperado de Mundo Fesc: https://www.fesc.edu.co/Revistas/OJS/index.php/mundofesc/article/view/48

Inteligencia artificial. (2018). LASSE ROUHIAINEN.

IONOS,. (2020). Programación declarativa: cuando el qué es más importante que el cómo. Recuperado de Digital Guide IONOS by 1y1: https://www.ionos.es/digitalguide/paginas-web/desarrollo-web/programacion-declarat iva/

IONOS. (2020). Programación imperativa: Resumen del paradigma de programación más antiguo. Recuperado de Digital Guide IONOS by 1y1: https://www.ionos.es/digitalguide/paginas-web/desarrollo-web/programacion-imperati va/

Leyva, M., & Florentin S. (2018). Inteligencia Artificial: Retos, perspectiva y papel de la

Neutrosofia. Revista Dilemas Contemporáneos: Educación, Política y Valores, I (Edición Especial).

Leyva, X. (2019). Expansion. Recuperado de https://expansion.mx/tecnologia/2019/10/08/este-asistente-virtual-ayuda-a-tratar-las-enfermedades-mentales

Lopez, P. (2013). Aprendizaje de y con robótica, algunas experiencias. Educacion. Recuperado de https://revistas.ucr.ac.cr/index.php/educacion/article/view/10628/10298

Munera, L. (1990). Inteligencia artificial y sistemas expertos. ICESI.

Nadal, Victoria. (2017). Los 'chatbots' que ayudan a reducir tu ansiedad. Recuperado de El Pais: https://elpais.com/retina/2017/12/18/talento/1513619563_062597.html

Ozamiz, Dosil, Picaza, & Idoiaga. (2020). Niveles de estres, ansiedad y depresion en la primera fase del brote de COVID-19 en una muestra recogida en el norte de España. España. Recuperado de https://www.scielosp.org/pdf/csp/2020.v36n4/e00054020/es

Pino, R., Gómez, A., & de Abajo Martinez, N. (2001). Introduccion a la inteligencia artificial: sistemas expertos, redes neuronales artificiales y computacion evolutiva. Servicio de publicaciones Universidad de Oviedo. Recuperado de https://books.google.es/books?hl=es&lr=&id=RKqLMCw3IUkC&oi=fnd&pg=PA10&dq=Sistemas+expertos+inteligencia+artificial&ots=iHGBm_v_cT&sig=p9VddegNd4LdTo6tSwbX_mkJgcI#v=onepage&q=Sistemas%20expertos%20inteligencia%20artificial&f=false

Rufiner, H., & Diego H., M. (2004). Sistema de reconocimiento automático del habla. Ciencia, Docencia y Tecnología, 151-177. Recuperado de https://www.redalyc.org/pdf/145/14502806.pdf

Sancho, S. (2018). Sistemas Expertos, el comienzo de la inteligencia artificial. Recuperado de Telefónica Tech: https://empresas.blogthinkbig.com/sistemas-expertos-el-comienzo-de-la/#:~:text=Los%20Sistemas%20Expertos%20fueron%20desarrollados,un%20experto%20de%20rendimiento%20superhumano.

Sanz-Moreno, Lutfi, Barra-Chicote, Lucas, J., & Montero, J. (SF). Desarrollo de un asistente domótico emocional inteligente. Universidad Politécnica de Madrid. Recuperado de http://www-gth.die.upm.es/research/documentation/AN-090Des-09.pdf

Sistemas Expertos y Lógica Difusa. (s.f.). Recuperado de file:///D:/JOSH/universidad/Sistemas%20Expertos/capitulo2.pdf

Soto, J. A. (23 de 10 de 2019). Geeknetic. Recuperado de https://www.geeknetic.es/Guia/1668/Windows-10-Todo-lo-que-necesitas-saber.html

Universidades, S. (2021). Santander Becas. Recuperado de https://www.becas-santander.com/es/blog/python-que-es.html

Vargas, E. A. (2011). Desarrollo de un prototipo de sistema experto para el apoyo en la toma de decisiones del proceso de selección de personal. Medellín: Universidad EAFIT - Escuela de Ingeniería.

Vega, M. (2021). Incidencia de la covid 19 en la estabilidad emocional de los estudiantes de octavo año. Guía de actividades físicas en épocas de confinamiento para mejorar la estabilidad emocional. Tesis doctoral, Univercidad de Guayaquil, Guayaquil. Recuperado de http://repositorio.ug.edu.ec/bitstream/redug/53994/1/VEGA%20QUEZADA%20MERCY%20JANETH.pdf

Annexes

Annexe 1.

To be process map

Annexe 2.

As is process map