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SCIENTIFIC ARTICLE

THEME:

"THE EFFICIENCY OF AN APPLICATION FOR THE GENERATION OF MENUS NUTRITIONAL FOR CHILDREN"

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The efficiency of an application for the generation of menus nutritional for children

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Summary. *The need for the companies of reduce costs and to improve performance in the implementations with computer systems has given place to the use of platforms in the cloud. Previous: The Gobierno Autónomo Descentralizado from Ibarra built SINUTI, which aims to improve the services of the CIBV within its jurisdiction. Objective: Automate and improve the processes for the generation nutritious menus. Method: A calculation has been performed of nutrients for the age and meal times, which are used inside SINUTI for the generation of menus. Results: SINUTI displays the composition of the menu food and if it's chord or not to the age of the children in little time. Conclusion: SINUTI decreases analysis and search time by not having to perform manual processes as the analyze the nutritional composition of a menu for a certain time of food. According to it mentioned is obtained that SINUTI is an efficient application to the moment of generating healthy and nutritive menus for children.*

Key words

SINUTI, CIBV, MSP, malnutrition child.

1. Introduction

The systems computer allows to the institutions offer products or services of form centralized what them allows automate and sort the information with a database available from any place with access to internet. The Government of the city of Ibarra must supervise 21 CIBV therefore it must control and improve the services that the same ones offer. The processes that are performed are manual and are required time to conduct the visits to each institution, in view of this a system was developed to centralize and automate processes and decrease the time in finding the information. For the generation of menus has used the Table of Food Composition for the Ecuador 2012. On the other hand, the application allows to know the state of growth and nutrition of infants by means of graphic statistics in order to know if the supply that child receive reduces the rates of child malnutrition and favor the development of physical capabilities, emotional, cultural and cognitive.

The CIBV or childcare's centers of the good live offer the services of development integrated child and nutrition. These services are monitored by control entities to ensure proper growth and development of the childs (SENPLADES S., 2009).

THE MSP is the Ministry of public health, which is in charge of taking anthropometric measures of children who attend the CIBV, these data are analyzed and interpreted manually and are subsequently delivered as reports to the coordinators of the Centers who must take the necessary measures in the event that a child has malnutrition (MIES, Norma Técnica de Desarrollo Infantil Integral, 2014).

The present research is focused on SINUTI-system nutrient child and as automates and improves the processes of them CIBV.

2. Methodologies and technologies of development of Software.

SINUTI was developed under the standards of Yii2, which is a framework of open code that allows building applications in a short time that meet the needs of customers, with friendly interfaces, the availability of extensions and widget that let you organize data Keck, B. (2014).

The methodology agile of development XP was used for the cycle of life of the project, which allows to the programmers and customers gather is constantly and deliver a software of quality Mousques, G. (2003).

According to the technical criterion of Dr. Susana Castillo Lara The calculation was performed of the energy requirements for child's 1 to 5 years.

2.1 Modules of the application

The development of the phase 1 is constituted of the following modules.

Child module:

• Institutions: record the data from the staff, location, address and contacts of the children's centers

• Kindergarten: register the personal data of infants.

• Growth patterns: register taking measures of height, weight, and BMI of childs.

• Eating habits: record information about the eating habits of childs.

Module dishes:

•Letters: it will allow the management of food menus or dishes that are validated according to the time of food and age.

•Food: it will manage the base of food and dishes of the system.

•Weekly letters: it will manage the letters or menus that administer the centers every week.

•Nutritional Values: manages the nutritional value of the food and dishes of the system

Reporting module

It is composed of the following reports:

• Patterns of growth by child.

•Statistics of the population by time and anthropometric measurements.

• Evaluation assessment of letters or weekly menus.

•Valuation assessment of menus and dishes.

•Percentage of adequacy of letters or menus.

2.2 Children's energy requirements

The information of who, FAO and MSP was used for the obtaining of macro- and micronutrients, all calculations have been validated by the technical personnel in the area of nutrition of the MSP.

The requirement daily energy is the kcal that the body needs to day for its correct operation. It then describes the obtaining of the requirements of proteins, fats and carbohydrates.

$Kcal/day = average\ weight * Kcal/kg/day$

Where kcal/kg/day are the kcal by kg to the day.

The proteins must cover of a 10 to 12% of the contribution caloric, while the fat must cover a 30% and finally them carbohydrates the remaining (MINEDuc, 2014). The results are shown in Figure 1.

Edad		PESO (kg)			Kcal/kg/día			Kcal al día	Proteínas (12%)	Grasas (30%)	CHO
		niña	niño	promedio	niña	niño	promedio	TOTAL, diario	Kcal	Kcal	Kcal
1	min	7,9	8,6	8,25	80,1	82,4	81,25	670,31	80,44	201,09	388,78
	max	10,1	10,8	10,45				849,06	101,89	254,72	492,46
2	min	10,2	10,8	10,50	80,6	83,6	82,10	862,05	103,45	258,62	499,99
	max	13	13,6	13,30				1038,73	124,65	311,62	602,46
3	min	12,2	12,7	12,45	76,5	79,7	78,10	972,35	116,68	291,70	563,96
	max	15,8	16,2	16,00				1249,60	149,95	374,88	724,77
4	min	14	14,4	14,20	73,9	76,8	75,35	1069,97	128,40	320,99	620,58
	max	18,5	18,6	18,55				1397,74	167,73	419,32	810,69
5	min	15,8	16	15,9	71,5	74,5	73	1160,70	139,28	348,21	673,21
	max	21,2	21	21,1				1540,30	184,836	462,09	893,37

Figure 1. Calculation of kcal per day with respect to the weight and age

It is carried out the same procedure for the macro and micronutrients and the contribution for each time of food Table 1 shows the percentage of power for each time of food (MINEDuc, 2014).

Proveedor	Descripción	Tiempos de comida	Porcentaje de alimentación
CIBV	Desayuno	1	25%
	Media mañana	2	10%
	Almuerzo	3	30%
	Media tarde	4	10%
Hogar	Merienda	5	25%
		Total	100%

Table 1. Percentage of food for each meal time.

The CIBV offers to the childs 4 meal times the Figure 2 shows the contribution kcal/day for every meal time

			TIEMPOS DE COMIDA							
Edad	Kcal al día		1		2		3		4	
(años)	Min.	Máx.	Min.	Máx.	Min.	Máx.	Min.	Máx.	Min.	Máx.
1	670,31	849,06	167,58	212,2	67,03	84,91	201,0	254,72	67,03	84,91
2	862,05	1038,7	215,51	259,6	86,21	103,8	258,6	311,62	86,21	103,8
3	972,35	1249,6	243,09	312,4	97,23	124,9	291,7	374,88	97,23	124,9
4	1069,9	1397,7	267,49	349,4	107,0	139,7	320,9	419,32	107,0	139,7
5	1160,7	1540,3	290,18	385,0	116,0	154,0	348,2	462,09	116,0	154,0

Figure 2. Ranges of kcal for age and meal times

3. Results

SINUTI allows creating menus foodstuffs by means of an assistant to go step by step creating a menu of food or preparations for a time of food specific showing in a graph automatically the nutritional composition that has a food according to their quantity in grams and if is or is not within the range for that time of food as can be seen in figure 3.
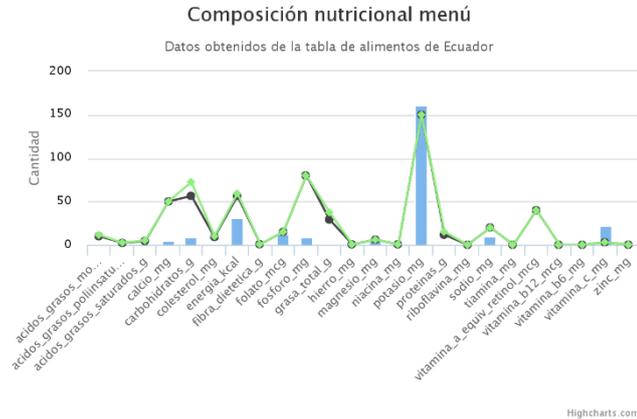

Figura 3. Nutritional composition of an apple of 60 gm for the refreshment of half a morning.

As you can see SINUTI dynamically displays the nutritional composition of foods that a menu will have a time of food given, thus allowing to know if amounts in grams are suitable for the age of the children,

Once the menu has been generated stakeholders can view the detail of the menu as shown in Figure 4.
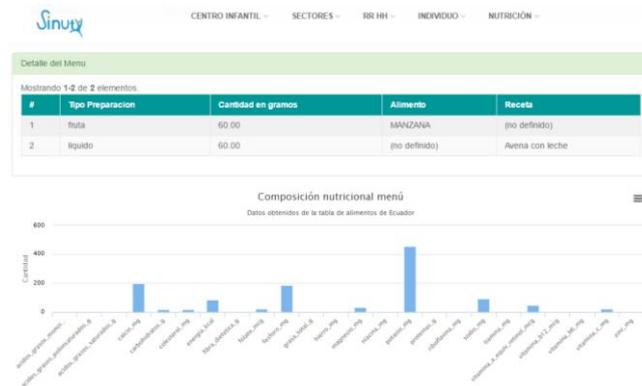

Figure 4. Detail of a menu for the refreshment of the half morning

4. Conclusions

SINUTI is efficient because it reduces the time needed to know if a menu is ideal for a diet of children in accordance to a time of food and age, since it automates the calculations that were performed using manual processes. This allows that you are not required to hire a nutritionist for this task and also controls the power that infants receive in the CIBV is adequate.

The use of computer applications automates and centralizes the processes and reduces the time of analysis and search for information.

The use of a framework and agile methodology allow developers focus on the basics of the project and deliver an efficient software that meets the needs and expectations of the customers.

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Bibliografy

[1]Belmont, P., Freire, W., Ramírez, M., & Silva, K. (2012). Tabla de composición de alimentos para Ecuador. Guayaquil: EL TELEGRAFO.

[2]Correa Delgado, R. (2012). Decreto Presidencial No. 1356. Quito.

[3]DII, & MIES. (2013). Protocolo de la jornada diaria de la niña y niño CIBV. Quito.

[4]DII, & MIES. (2014). Módulo de Nutrición U1. Quito: Dirección de Comunicación Social.

[5]Dr. Cordero, D., & Dra. Mejía, M. (2007). Los nuevos patrones de crecimiento de la OMS. La Paz: OPS/OMS.

[6]FAO. (2015). Depósito de documentos de la FAO. Obtenido de http://www.fao.org/docrep/006/w0073s/w0073s0d.htm

[7]FAO/OMS; Naciones Unidas; CEPAL. (2007). Principios y aplicaciones de las nuevas necesidades de energía. Chile.

[8]FAO; OMS. (2016). Nuevos estándares de crecimiento. Obtenido de http://www.who.int/childgrowth/standards/es/

[9]Figueroa, D., Sevilla, H., & Castillo, O. (2016). Obtenido de Fases de la Programación Extrema: http://programacionextrema.tripod.com/fases.htm

[10]FPDF.org. (2016). FPDF Library. Obtenido de http://www.fpdf.org/

[11]Freire., W., Ramírez, M., Belmont, P., Mendieta, M., Silva, K., Romero, N., . . . Monge, R. (2014). Encuensta Nacional de Salud y Nutrición. Quito: Telegrafo.

[12]GAD-I, & MIES. (2015). Convenio de cooperación económica MIES y GAD-I para la implementación de servicios de desarrollo infantil. Ibarra.

[13]Hernández, D. M. (2016). Obtenido de Recomendaciones nutricionales para el ser humano: actualización: http://bvs.sld.cu/revistas/ibi/vol23_4_04/ibi11404.htm

[14]Jeffries, R., Anderson, A., & Hendrickson, C. (2000). Extreme Programming Installed. (S. Mejía, Trad.) Boston: Longman Publishing Co.

[15]Keck, B. (2014). Yii 2 for Beginners. (S. Mejía, Trad.) Victoria: Lean Publishing.

[16]MAGAP. (2015). Términos de referencia para la contración de almuerzo escolar. Quito: MAGAP.

[17]MIES. (2012). Informe de Gestión. Quito: Dirección de Comunicación Social.

[18]MIES. (2014). Norma Técnica de Desarrollo Infantil Integral. Quito: (D. d. MIES, Ed.).

[19]MINEDuc. (2014). Programa de alimentación escolar. Quito.

[20]Ministerio Coordinador de Desarrollo Social. (2015). Programa Acción Nutrición. Obtenido de http://www.desarrollosocial.gob.ec/programa-accion-nutricion/

[21]Mousques, G. (2003). Metodología XP. Uruguay: Universidad ORT.

[22]MSP, & Dirección Nacional de Nutrición. (2000). Los nutrientes en el organismo. Quito: PANN.

[23]Procopio, M. (2016). Requerimientos diarios de proteínas. Obtenido de http://www.portalfitness.com/nutricion/tablas_proteinas.htm

[24]Procopio, M. (2016). Tabla de requerimientos diarios de las vitaminas. Obtenido de http://www.portalfitness.com/nutricion/tabla_vitaminas.htm

[25]Procopio, M. (2016). Tabla de requerimientos diarios de los minerales. Obtenido de http://www.portalfitness.com/nutricion/tabla_minerales.htm

[26]Qiang Xue, A. M. (2014). The Definitive Guide to Yii 2.0. (S. Mejía, Trad.) Birmingham: Yii Software LLC.

[27]SENPLADES, S. (2009). Plan Nacional para el Buen Vivir. Quito: SENPLADES.

[28]Shore, J., & Warden, S. (2008). The Art of Agile Development. (S. Mejía, Trad.) Gravenstein: O'Reilly.

[29]Unicef, & WHO. (2013). Improving Child Nutrition. (S. Mejía, Trad.) New York: United Nations Publications.

[30]Yii Suporters. (2015). Yii Framework 2.0 API Documentation. Obtenido de http://www.yiiframework.com/doc-2.0/

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