European Journal of Health and Biology Education
ISSN: 2165-8722
OPEN ACCESS
2017 6(1): 13-18
DOI: 10.29333/ejhbe/64568

Teaching about Nutrition using ICTs

David González Flores [1*], Ana Beatriz Rodríguez Moratinos [1], Javier Cubero [2]

[1] Department of Physiology, Faculty of Science, University of Extremadura, Badajoz, SPAIN

[2] Health Education Lab. Experimental Science Education Area, University of Extremadura, Badajoz, SPAIN

Received 28 June 2017 ▪ Revised 15 September 2017 ▪ Accepted 8 November 2017

ABSTRACT

This work shows the work of pedagogical study developed within a seminar called "Nutritional and Dietary Analysis (DIAL Program)" as a part of the theoretical content of Physiology of Reproduction and Vegetative Functions, a subject of Biology degree in the University of Extremadura (Spain), with the purpose of contributing to the learning of the students about the main principles of digestive system and nutrition through a guided practice. This curriculum development is based on the answers to a serial of questions from the theoretical contributions of the area, using the nutritional analysis program DIAL and the nutritional needs of the students as a tool. We believe that this methodology of model curriculum development, in which a dialogue between theory and practice was used, it could be an interesting way to improve the academic performance of the students. Furthermore, it allows the students to think about the current nutritional problems according the results obtained.

Keywords: curricular development, learning progression, biological knowledge, field work

INTRODUCTION

The relationship between teacher education and practical work has been a highly considered aspect among teachers (Boyer and Tiberghien, 1989; Rodrigo, 1993; García Barros, 1998; cited in Rodrigo et al., 1999). The work of research and inquiry about the practices carried out by teachers and how they can improve, are presented as a clear need in the current scenario of Science Teaching (Rodrigo et al., 1999). In addition, the field work is beneficial not only for future teachers but also professionals like an approach to the everyday world.

Furthermore, a change in Everyday Knowledge, Scientific Knowledge is required, mainly to facilitate that students reach to understand the main concepts and the construction of a School Knowledge. A key eleelement to guide curriculum design must be the gradual development of intellectual, ethical and interpersonal skills that allow the students to create their own opinion, to make decisions and to act in natural and technological-related situations. (Amórtegui et al., 2010).

Several studies have shown that textbooks for students show a series of weak subject-matters between educational levels and in which the relevant concepts are blurred (Gomez et al., 2009; Fortus and Krajcik, 2012); the above-mentioned problem is associated with the fact that in practice the actual application of the curriculum is carried out by teachers preferably using instructional items (Lockheed, 1993). That is a relevant situation since it has been found that curriculum coherence is one of the most important predictors of students performance in tests such as TIMSS (Smith et al., 2005; Fortus and Krajcik, 2012).

The inquiry learning is a teaching-learning methodology, through which the student has to find solutions to a problem situation from a research process. This methodology focuses on addressing problems and cooperative work. The inquiry work enhances the work on skills required for a worker in a changing world: A resolute person who can work in teams and has a critical approach (Mas and Pons, 2015).

It is also a methodology that provides greater ability in scientific and mathematical processes. During the inquiry process, students work independently and become direct protagonists of their learning, and the teacher is the provider of resources. According Mestre (1997), the role of the teacher is to motivate and guide the student with

✉ eolis2@hotmail.com **(*Correspondence)** ✉ moratino@unex.es ✉ jcubero@unex.es

such a mastery that he feel like the protagonist of his learning and do not perceive it as the result of the direction of the teacher.

ICT is another tool in the educational environment and it could serve for the construction of knowledge. To achieve its effective use in schools, a translation of traditional teaching strategies into a virtual platform must be avoided, since this generally is neither feasible nor helpful. It is necessary to develop new practices with own goals in order to improve learning, focusing the teaching strategies on the use of ICT and its linkage with the specific didactics (Rossi et al., 2013; Vogt and Kuhn, 2013a, 2013).

The impact of ICT on the field of education is indicating the emergence of a new pedagogical paradigm in didactics and technology. The vision and pedagogical thoughts about teaching processes make all the ways to include multimedia resources in the design and implementation of educational proposals (Forestello, 2013). According to (Eisner, 2002) education will not have permanent solutions to their problems; we will make neither a dramatic progress nor definitive findings forever useful. We are linked to temporary resolutions, not permanent solutions. What works in one case might not in another. What works today may not work tomorrow. We are not trying to invent the radar or measure the speed of free fall in the void. Our tasks are affected by the context, they have unpredictable contingencies, answer to local conditions and are made by those who are taught and not only by those who teach. But the complexity and uncertainty of education are factors which make it stimulating. Always clinical skills and artistic ability will be required to do something really good.

In a study of assessment carried out by students (Garofalo et al., 2016) the results showed were that students would be highlighting the importance of generating disciplinary practices in which teaching resources are included and, perhaps, where students have worked as a theory in other curriculum areas, but they have been forgotten since they have not been implemented.

A significative quantity of research reveals that, in the area of science, students have multiple points of view on the same phenomenon, instead of focusing on the explanations of textbooks or those held by experts (Linn, 2002). This has promoted a tendency to speak of integration of knowledge or concept development, rather than try the conceptual change or the eradication of the preconceptions in students (Pozo and Gomez-Crespo, 2009).

AIMS

In this paper, we show a proposal for curriculum development based on the use of a field practice, through the nutrition DIAL program ®, which allows students make their own track of their diet and, base don that, estimate what nutrients are deficient and what problems may be generated because of them.

DEVELOPMENT

Regarding the language, a development of notions shared by students, teachers and texts was searched, and gradually introduced, for example, stomach, swallowing, vitamins, toxicity, etc.

The work was carried out taking into account 3 stages of work, in which contextualization, collecting and systematizing information and analysis of results was performed.

METHODOLOGY

After a first stage in which students are taught the basics about nutrition, several groups of practices are performed and weekly diet of individuals will be collected using the DIAL program.

This program was carried out by a large group of Teaching and Research of the Faculty of Pharmacy of the Complutense University of Madrid and the School of Industrial Engineers of Madrid (Cubero et al., 2007).

The DIAL program has been designed to calculate, preset and modify any type of diet in an easy, simple and quick way. Although it is suitable for professionals, it is also a very versatile program that can be handled by students. It allows us to know instantly the energy and nutrients contained in the food we eat and easily prepare any type of diet (Cubero et al., 2007).

Applications for this program, which is based on the tables of nutritional composition of food, are many and varied, and it is very useful in the daily practice of nutrition and dietetics, not only for professional but also for those persons wishing to make a healthy and nutritionally balanced diet. It is useful in research in nutritional epidemiology in education and business.

It has a table of nutritional composition of about 700 dishes, which contains a wide information on the composition in energy, proteins, lipids, carbohydrates, fiber, minerals, vitamins, cholesterol, fatty acids, amino acids, etc. (Up to a total of about 140 different components) of the most common foods. The product information can be located not only through the common name, but also includes an extensive list of local, regional or national

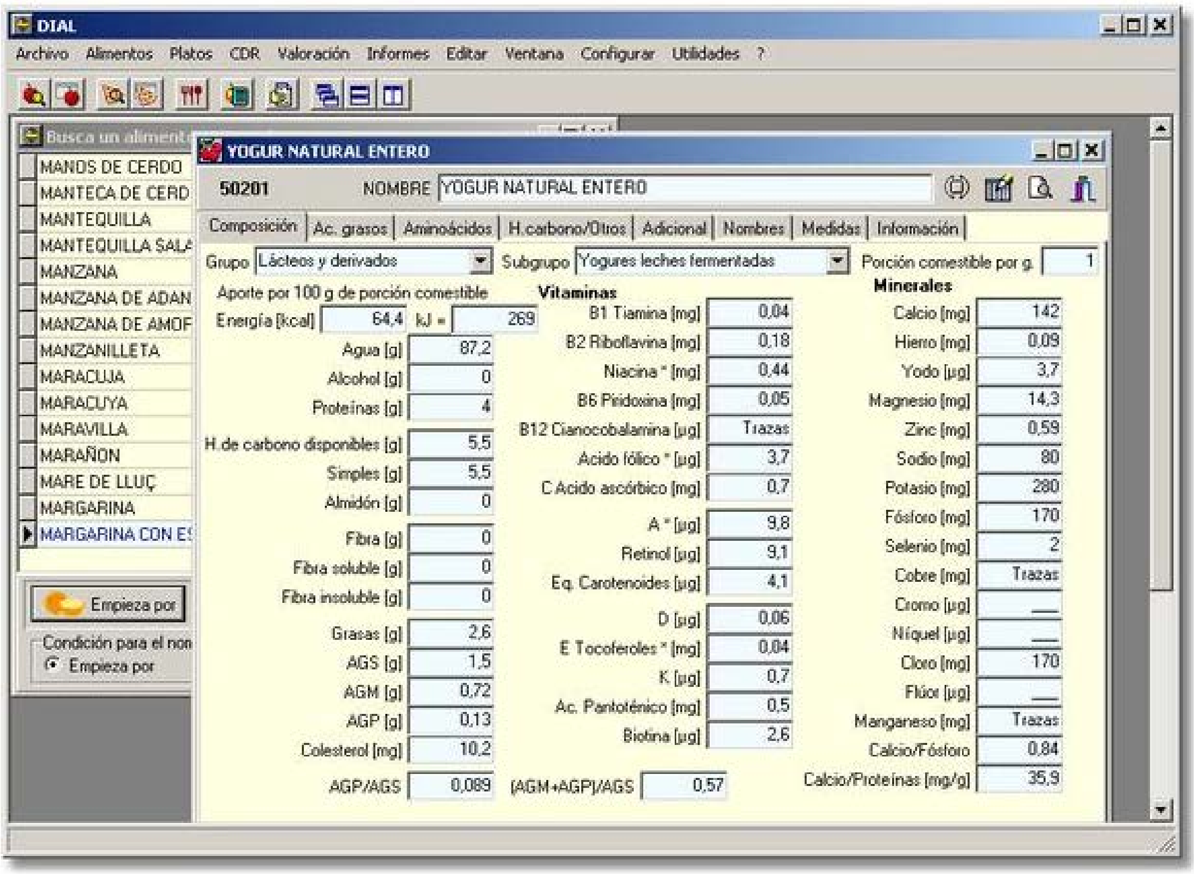

Figure 1.

denominations, up to a total of about 1800 different names, in addition to the possibility to search by scientific name and its equivalent in English.

As shown in **Figure 1**, food tables collect information on the average content of nutrients and other substances that provide food when consumed; they are the basis to transform food into energy and nutrients (necessary step to judge a diet). In order to prepare the DIAL® program, one of the first steps was the creation of a table of food. This fact was taken into account during the design of the food composition table that was used in this program. So when the user wants to add a new food to the food composition database, he should be very careful and consider, at least, the meaning of each of the fields listed in the nutrition tab. Another aspect to consider is that the edible portion is expressed in grams per gram of whole food (as it is acquired and before any preparation), while the rest of the information refers to 100 g of food (Cubero et al., 2007).

After data collection, students will have time to analyze the results, to see which nutrients they have an adequate intake and which they have not. Since that moment, they will do a manuscript and after a presentation arguing what health problems may appear due to the lack of these concrete nutrients in the individuals. Therefore, the data obtained will be completed with a review made by the students themselves.

Taking advantage of Internet resources and develop experience and skills in order to find reliable and useful information on which research could be supported, as well as considering several inherent issues, provide a deeper knowledge on the subject, resulting in benefits not only for research, but also for work in the classroom (Valeiras, 2010).

RESULTS

An important element is to consider that the introduction of ideas is closely related to the activities carried out and the work context. A key point of the modeling process is the fact that phenomena are modeled. Therefore, model is valid if success in explaining a phenomenon in the world.

Although in the first instance it had claimed that there are differences between what teachers think and what their students think about how the field practices contribute to the teaching and training on future biologists. This pedagogical practice allowed that, somehow, teachers and students found out some meeting points, because the students themselves should teach the rest of companions parts of matter that others did not know.

Therefore, It is very important to encourage meditation processes that allow future biology teachers to build their didactic knowledge of biological content, from the appropriation of field practices as a strategy in teaching biology. Such reflection can be framed within biological pedagogical or didactic and disciplinary components of professional training programs, and also from adaptation component, allowing students to recognize that their experience is fundamental to their future teaching work. It is clear that this reflection could be cross at least during the basis cycle from the environment of pedagogy in these semesters.

In addition, the interest of students, the use of tutoring and academic results are significantly enriched by this methodology. You could even extend such work, if the level of the students is appropriate, by carrying out a statistical study to see if the intake of certain nutrients among various groups of the class is significantly different depending on several factors (height, weight, etc.).

Inside the Curricular Project Degree in Biology, it is very important to create spaces in which future professionals approach the field practices design, enabling them to further their learning processes in terms of teaching biology in the context of Biologist Professional Knowledge; activities such as workshops, guides and asking questions in field guides encourage meditation on that knowledge, which may lead positively in the design of a practice field. Similarly, these approaches can be extended to any initial training program for biology teachers in several contexts, it should even consider in teacher training in science.

REFERENCES

Akker, J. van den (2003). The science curriculum: between ideals and outcomes. In B. J. Fraser & K. G. Tobin. *International Handbook of Science Education (Part One).* (pp. 421-447). Netherlands: Kluwer.

Alarcón, & Piñeros, I. (1989). Las salidas de campo como un recurso pedagógico. Modelo de una salida (Bachelor's Thesis in Biology and Chemistry). Bogotá: University of La Salle, School of Education Sciences. 106 p.

Archer, A., Arca, M., & Sanmartí, N. (2007). Modeling as a Teaching Learning Process for Understanding Materials: A Case Study in Primary Education. *Sci. Ed., 91*,398-418.

Baldaia, L. (2006). El cambio de las concepciones didácticas sobre las prácticas, en la enseñanza de la biología. *Revista Alambique: Didáctica de las ciencias experimentales. 47*(1), 23-29.

Bonilla, E., & Rodríguez, P. (1997). *Más allá del dilema de los métodos*. Santa Fe, Bogotá: Norma Editorial Group. 220p.

Clement, J. (2000). Model based learning as a key research area for science education. *Int. J. Sci. Educ., 22*(9), 1041-1053.

Coll, R. K., France, B., & Taylor, I. (2005). The role of models and analogies in science education: implications from research. *International Journal of Science Education, 27*(2), 183-198.

Cubero, J., Narciso, D., Valero, V., Rodríguez, A.B., & Barriga, C. (2007) Características y aplicaciones de software en dietética y nutrición para su uso en poblaciones sanas y pacientes críticos. *Enfermería Global, 10*, 1-15.

De Posada, J. (2000). El estudio didáctico de las ideas previas. p 363-388. In Perales, F y Cañal, P (eds.). *Didáctica de las ciencias experimentales*. Spain: Editorial Marfil. Alcoy, 703p.

Del Carmen, L. (2000). Los trabajos prácticos. p 267-287. In Perales, F and Cañal, P (eds.). *Didáctica de las ciencias experimentales*. Spain: Editorial Marfil. Alcoy, 703p.

Del Carmen, L., & Pedrinaci, E. (1997). El uso del entorno y el trabajo de campo. p 133-154. In Del Carmen, L (coordinador). *La enseñanza y el aprendizaje de las ciencias de la naturaleza en la educación secundaria*. Barcelona, Spain: Editorial Horsori, 222p.

Eisner, E. (2002). *La escuela que necesitamos. Ensayos personales*. Buenos Aires: Amorrortu.

Forestello, R. (2013). Algunas pistas para pensar la integración de las TIC en la enseñanza. *Revista de Educación en Biología, 16*, 7-14.

Fortus, D., & Krajcik, J. (2012). Curriculum coherence and learning progressions. In B. J. Fraser; K. G. Tobin & C. McRobbie. *Second International Handbook of Science education. (Part Two)*. (pp. 783-798). NY: Springer.

García, J. E. (1997). La formulación de hipótesis de progresión para la construcción del conocimiento escolar: una propuesta de secuenciación de la enseñanza de la ecología. *Alambique, 14*, 37-48.

García, J. E. (1998). *Hacía una teoría alternativa de los contenidos escolares*. Spain: Diada.

García, P. (2005). Los modelos como organizadores del currículo en biología. *Enseñanza de las Ciencias, Número extra*, 1-5.

Garófalo, S. J., Chemes, L. B., & Alonso, M. (2016) Propuesta didáctica de enseñanza con simulaciones para estudiantes del profesorado en Ciencias Biológicas. *Revista Eureka sobre Enseñanza y Divulgación de las Ciencias, 13*(2), 359-372.

Giere, R. N. (Ed.). (1992). *Cognitive models of science*. USA: University of Minnesota Press.

Gómez, A. (2008). Construcción de explicaciones multimodales: ¿Qué aportan los diversos registros semióticos? *Revista latinoamericana de estudios educativos, 4*(2), 83–99.

Gómez, A. (2009a). Un análisis desde la cognición distribuida en preescolar: el uso de dibujos y maquetas en la construcción de explicaciones sobre órganos de los sentidos y sistema nervioso. *Revista Mexicana de Investigación Educativa, 14*(41), 403-430.

Gómez, A. (2009b). El estudio de los seres vivos en la Educación Básica. *Enseñanza del sistema nervioso desde un enfoque para la evolución de los modelos escolares*. Mexico: Universidad Autónoma de Nuevo León.

Gómez, A. (2011). Desarrollo de modelos científicos escolares sobre órganos de los sentidos y sistema nervioso en educación básica. In J.B. García Horta & C. Campillo Toledano (Eds.), *Escenarios y actores educativos: experiencias y reflexiones sobre la educación en México*. (pp. 60-82). Mexico: UANL.

Gómez, A. (2013). Explicaciones narrativas y modelización en la enseñanza de la biología. *Enseñanza de las Ciencias, 31*(1), 11-28.

Gómez, A., Adúriz-Bravo, A., Guerra-Ramos, M., & Marbà- Tallada, A. (2009). Explanations on sense organs and nervous system: A content analysis of primary school textbooks. In *Memories of the congress of NARST*. (pp. 1-12). Garden Grove, CA, USA.

Gómez, A., Sanmartí, N., & Pujol, R. (2007). Fundamentación teórica y diseño de una unidad didáctica para construir el modelo de ser vivo en la escuela primaria. *Enseñanza de las Ciencias, 25*(3), 325-340

Gutiérrez, R. (2004). La modelización y los procesos de enseñanza aprendizaje. *Alambique, 42*, 8-18.

Izquierdo, M., & Adúriz-Bravo, A. (2003). Epistemological foundations of school science. *Science & Education, 12*(1), 27-43.

Izquierdo, M., Espinet, M., García, M. P., Pujol, R. M., & Sanmartí, N. (1999). Caracterización y fundamentación de la ciencia escolar. *Enseñanza de las Ciencias, núm. Extra*, 79-91.

Kress, G., Jewitt, C., Ogborn, J., & Tsatsarelis, C. (2001). Multimodal teaching and learning. *The rhetorics of the science classroom*. London: Continuum.

Linn, M. (2002). Promover la educación científica a través de las tecnologías de la información y comunicación (TIC). *Enseñanza de las Ciencias, 20*(3), 347-355.

Lockheed, M. (1993). The condition of primary education in developing countries, In H. Levin & M. Lockheed (Eds.) *Effective schools in developing countries*. London: World Bank.

Mas, A. M., & Pons, L. M. (2015). Pregúntate, indaga y a la vez trabaja algunas competencias. *Revista Eureka sobre Enseñanza y Divulgación de las Ciencias, 12*(1), 198-211.

Matthews, M. (2007). Models in science and science education: An introduction. *Science & Education, 16*, 647-652.

Mestre Gómez, U. (1997). Convertir al estudiante en protagonista de su aprendizaje: una tarea actual. *Revista Con Luz Propia*, (7), 55-67.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: an expanded sourcebook*. US: Thousands Oaks. 338p.

Perales, F. J., Sierra, J. L., & Vilchez, M. (2002) ¿Innovar, investigar? ¿Qué hacemos en didáctica de las ciencias? *Alambique, 34*, 71-81.

Pozo, J. I., & Gómez-Crespo, M. A. (2009). Del conocimiento cotidiano al conocimiento científico: más allá del cambio conceptual. In J. I. Pozo and M. A. Gómez-Crespo (eds.). *Aprender y enseñar ciencia*. Madrid: Morata, 128-146.

Rodrigo, M., Morcillo, G., Borges, R., Calvo, M., Cordeiro, N., García, F., & Raviolo, A. (1999). Concepciones sobre el trabajo práctico de campo (TPc); una aproximación al pensamiento de los futuros profesores. *Revista Complutense de Educación, 10*(2), 261-285.

Rossi, M.., Gratton, L. M., & Oss, S. (2013). Bringing the Digital Camera to the Physics Lab. *The Physics Teacher, 51*, 141-143.

Sanmartí, N. (2002). *Didáctica de las ciencias en la educación secundaria obligatoria*. Madrid: Síntesis Educación.

Secretary of Public Education. (2008). Basic Education, Primary, Curriculum 2009. Test Stage. Mexico: SEP.

Sensevy, G., Tiberghein, A., Sylvain-Laubé, J., & Griggs, P. (2008). An epistemological approach to modeling: Cases studies and implications for science teaching. *Science education, 92*, 424-446.

Valbuena, E. (2007). *El Conocimiento Didáctico del Contenido Biológico. Estudio de las concepciones disciplinares y didácticas de futuros docentes de la Universidad Pedagógica Nacional* (Colombia) (Thesis of Doctor in Experimental Sciences). Madrid: Universidad Complutense de Madrid. 633p.

Valeiras, N. (2010). Nuevos escenarios en la formación docente. Internet como fuente de información y los escritos científicos. *Revista de Educación en Biología, 13*(1), 1-4.

Vogt, P., & Kuhn, J. (2013) Analyzing radial acceleration with a smartphone acceleration sensor. *The Physics Teacher, 51*, 182-183.

http://www.ejhbe.com