

# Online teaching-learning strategy on nutritional therapy for undergraduate students in the health area

Andreia Araujo Lima Torres<sup>1</sup>  
Kelb Bousquet-Santos<sup>2</sup>

<sup>1</sup> Programa de Pós-graduação em Psicologia Clínica e Cultura. Projeto Ensino na Saúde. Universidade de Brasília. Brasília, DF, Brasil.

<sup>2</sup> Programa de Pós-graduação em Ciências e Tecnologias em Saúde, Faculdade de Ceilândia. Universidade de Brasília. Brasília, DF, Brasil.

Correspondence  
Andreia Araujo Lima Torres  
E-mail: [andreiat@camposetorres.com.br](mailto:andreiat@camposetorres.com.br)

## Abstract

Multidisciplinary teams on nutritional therapy require knowledge on enteral and parenteral nutrition, without which the care of patients with special dietary needs is compromised. In the Campus Ceilândia of University of Brasília, one single nutrition course is available to students of Nursing, Pharmacy, Physiotherapy, Occupational Therapy and Collective Health. The course covers a range of topics, and students consider “nutritional therapy” the most complex of them. To improve their understanding on the subject, two video lectures were created, edited and made available through a virtual learning environment (Moodle), which also served as preparation for the actual classes. This study evaluated the effect of this material on the learning and satisfaction of these students. The videos were produced considering the principles of cognitive theory. The satisfaction scoring scale was available to students via Moodle. Tests to evaluate learning were taken in the classroom. We evaluated the ratio between the number of accesses to the video classes and the students’s performance on assessments and the final grade, by Spearman correlation. There was a high degree of student satisfaction with the material. It was also observed that the more students viewed the video classes the higher were the grades in the assessments. The videos were adequate for teaching the proposed content. Further studies are required to assess the cost-effectiveness of this strategy among health professionals working within the SUS (Public Healthcare Service).

**Key words:** Human Resources Formation. Teaching. Video classes. Learning Objects. Instructional Design. Nutrition Therapy.

## Introduction

Health is both the outcome of and the condition for the development of a society, its security and rights assurance.<sup>1</sup> Taking into account that health professionals are essential for the service effectiveness, the World Health Organization asserts that it will only be possible to tackle the current world health if the “right” professionals, with the “right” skills, at the “right” places and making the “right” things are available.<sup>2</sup> For this reason “health workforce” has been a theme increasingly present in health policy agendas.<sup>3</sup>

The academic education of health professionals in Brazil is connected with the country’s history, the health model adopted, the social demands and market pressures.<sup>4</sup> The implementation of SUS, the Brazilian Public Healthcare Service, induced the expansion of the public healthcare network.<sup>5</sup> In order to meet the demand for professionals in this area, SUS has undertaken as one of its roles the guidance and formulation of political-educational projects to improve the teaching-learning process.<sup>6</sup> But despite the efforts that have been made, it can be seen large deficits of suitability, skills, competences and motivation of the healthcare practitioners, often hostages to undergraduate courses that are detached from the needs and dynamics of the work environment and victims of the chronic lack of qualification and training policies.<sup>7</sup>

It is imperative that health professionals update their knowledge and skills continuously to be constantly equipped with new evidences in this field. However, to reconcile the workload of health professionals with the required continuing education is a huge challenge, which increases the demand for innovative educational methods to replace traditional teaching and promote behavior changes<sup>8,9</sup> and the development of competences. Continuing education proposes the transformation of professional practices based on a critical review and questioning of existing health practices in real daily situations.<sup>10,11</sup>

The inclusion of new information and communication technologies (NICT) in the continuing education process has been pointed as a viable strategy for qualification of health practitioners.<sup>12</sup> In the field of Nutrition, the care of individuals with special nutrition needs requires the knowledge of multi-skilled professional teams trained specifically for the practice of Nutritional Therapy.<sup>13</sup>

In Brazil, the use of digital technologies in the education and qualification of health professionals is entirely viable. According to *Instituto Brasileiro de Geografia e Estatística – IBGE* (Brazilian Institute of Geography and Statistics), the country ranks first in Latin America and the 62th in the world regarding the use of the Internet.<sup>14</sup> In addition, most undergraduates today were born after 1990 and are the first cohort of students continuously connected,<sup>15</sup> which requires teaching methods ever more updated, dynamic, individualized and motivating.<sup>16</sup>

Gaining complex knowledge requires time. In a human nutrition course offered to college students in a public Brazilian university, the students considered the content of “Nutritional Therapy” as the one most difficult to be understood. Proctored tests taken by students also showed that the questions relating to this theme were the ones less scored. For this reason teachers of this discipline considered of vital importance to enhance the strategies and teaching media so that the theme can be well understood by students who may eventually integrate multi-professional teams of nutritional therapy (MTNT) in the care of individuals with special nutrition needs.

The use of educational videos is a viable strategy once they can reinforce concepts developed in the classroom, facilitate the understanding and discussion of important issues, serve students with diverse learning styles and enhance motivation and enthusiasm to learn<sup>17</sup> about special nutrition needs.

According to the National Food and Nutrition Policy,<sup>18</sup> special nutrition needs refer to nutrition particularities, either restrictive or supplementary, of individuals suffering from metabolic or physiological alterations that may cause temporary or permanent changes related to the biological use of nutrients or the feeding routes (enteral or parenteral). Examples of individuals with special nutrition needs include those with inborn errors of metabolism, celiac disease, HIV/Aids, food intolerances or allergies, prematurity, kidney diseases, eating disorders, among other conditions.

This study resulted from the need to assess the use of new teaching materials produced for a nutrition discipline administered to students of five health courses. Two main questions must be answered when using NICTs in the teaching process: what is the efficacy (does the tool used improve the teaching-learning process?) and the efficiency (in which actual circumstances would the tool or strategy be useful?). What are the impact and the cost-effectiveness of NICTs?<sup>19</sup>

## Methodology

Human Nutrition in Health has two academic credits, corresponding to 30 hours, distributed during the semester in once-a-week lectures, each lasting 1h40min. It is a basic discipline offered to students of five academic courses: Nursing, Pharmacy, Physiotherapy, Collective Health and Occupational Therapy. Despite the importance of the theme, it is the only discipline in the area offered to them throughout the course and, therefore, covers a wide range of subjects in a very short time. Among the topics discussed, the students consider Nutritional Therapy as the more complex, leading to a poor performance in the tests and assessments during the semester.

As a remedial strategy, the discipline was restructured after an analysis of the students' profile, an interview with the teacher of the discipline and an assessment of the instructional materials available.

The course restructuring consisted in: 1) defining and classifying the educational goals of the "Nutritional Therapy" module; 2) defining the sequence of the contents of the module; 3) defining the educational procedures; 4) defining and developing the contents of the module; 5) choosing the media for distribution of support materials; 6) modeling the platform for presentation of the contents; 7) preparing the instruments for evaluation of the learning process; and 8) preparing the instruments for assessment of the students' satisfaction.

During the module planning stage, references were found in the literature in the form of scientific articles and manuals suited to the teaching of the topic. However, multimedia materials in Portuguese and suitable to the purposes of the course were not found. Therefore, two video lectures were prepared to supplement the two theoretical lectures related to the theme. The first video lecture is 18 minutes in length and introduces the "Nutritional Therapy" topic, defines important themes, and discusses the criteria for the selection of enteral or parenteral feeding. Also, it discusses the benefits of enteral nutrition, its indications and contraindications, enteral access techniques and devices, and ways to minimize complications associated with the diet infusion. The second video lecture, with length of 10 minutes, deals with "Parenteral Nutritional Therapy", its indications and contraindications, access techniques and devices, kinds of solutions, and protein and energy requirements in special conditions.

The *KeyNote*, *Screenflow* and *iMovie* software were used to record and edit the video lectures. The process of slides production, recording and editing of each video lecture took five hours on average.

As in the video lecture the speech is not directed to a group of students, such as in the traditional face-to-face class, but to a student who will watch the class alone,<sup>20</sup> the language of the explanations needed to be adjusted to the singular, in a dialogical format. After recoding and editing, the lectures were available to the students in the virtual learning environment used in the institution (Moodle) along with the recommended scientific papers and slides of the lecture. The virtual learning environment enabled to investigate the number of times the students accessed the materials.

The recorded material in the form of video lectures was available to the students two weeks prior to the live class, allowing students to watch, take notes and revise the contents at the pace they deemed most appropriate. Therefore, the students could access the lessons as many times as they deemed necessary until the end of the semester. In the two live lectures on the theme, the contents were in-depth revised, doubts were clarified and exercises to reinforce the lessons learnt were provided.

To prepare the satisfaction assessment tools of 47 students that attended the survey, scales proposed by Abbad, Zerbini & Borges-Ferreira<sup>21</sup> were adapted, which were available in the virtual learning environment after completion of the module activities.

In the particular approach of this study the ratio between the number of accesses by the students to the video lectures and their performance in the exams and in the final grade in the discipline was examined. Learning was assessed through tests covering the contents discussed, and data was analyzed by the Spearman's correlation test through the Statistical Package for the Social Sciences (SPSS *Statistics*, version 20).

The study was approved by the Research Ethics Committee of the Faculty of Health Sciences, University of Brasilia, on March 12, 2013 (process no. 01303912.7.0000.0030).

## Results

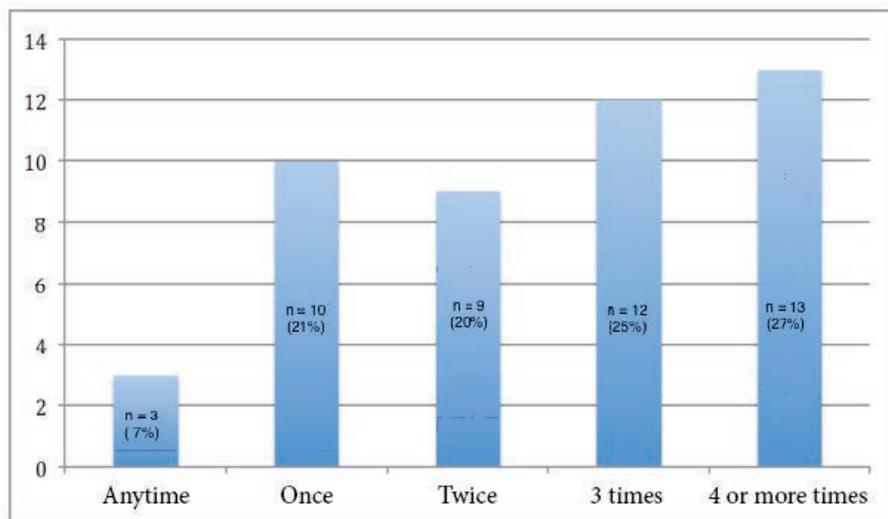
The responses of the students to the resources used in the virtual learning environment of the course were assessed through the administration of a satisfaction tool previously constructed and validated. Thirty-eight students (80.85% of the class) responded the survey. In general, it could be observed that the students considered the topic extremely important to their future professional life (average = 9.6). Yet, the perceptions of the students on their own dedication to the studies, which were also assessed in averages, were low (Table 1). Regarding the strategies used, the students considered the video lectures (average = 8.5) as important in building knowledge as the exams (average = 8.6).

**Table 1.** Students' satisfaction survey at the end of the semester regarding the online education strategy on nutritional therapy to which they were exposed. Health undergraduates. Brasília, 2013.

Item	Mean	Median	Mode	Standard Deviation
Quality of the video lectures	8.97	9.00	10.00	1.20
Importance of the video lectures to learning	8.50	8.00	9.00	1.20
Importance of tests to learning	8.60	8.00	8.00	1.30
Usefulness of the video lectures in the professional life	9.28	10.00	10.00	1.05
Access to the virtual environment with the frequency required to learning	7.15	8.00	8.00	2.75
Studying with the required frequency	6.58	7.00	7.00	2.29

Escala de pontuação: 0 (ruim) a 10 (excelente)

Through the institutional virtual learning environment (Moodle), it was possible to find out the number of times that the students accessed the video lectures prepared for this module. Figure 1 shows that 7% (n=3) of the students did not access the multimedia material any time and 27% (n=13) of them accessed it more than four times.



**Figure 1.** Number of times the video lectures were viewed by health undergraduates exposed to online education on nutritional therapy. Brasília, 2013.

The students who accessed the video lessons twice or more times (withNTICs) were compared to the students who did not access the video lessons or accessed them only once (w/oNTICs). It was found that the students who viewed the video lectures more times had better results in the assessments on the theme (Table 2).

**Table 2.** Comparison of the students' grades with the highest and lowest number of accesses to the video lectures. Health undergraduates exposed to online education on nutritional therapy. Brasília, 2013.

Item	withNTICs	w/oNTICs
Number of students	34	13
Mean	6.91	5.48
Median	6.96	6.60
Standard deviation	1.17	1.76

withNTICs = students who accessed the videos twice or more times.

w/oNTICs = students who did not access the videos or did it just once.

The Spearman's correlation test ( $p < 0.001$ ) showed that the more times the video lectures were viewed the higher the grades in the tests and in the final exam of the course (Table 3). The table also shows that the grades in parenteral nutrition items were lower than those in the "Enteral Nutrition" theme, which serves as a basis for further interventions in this discipline.

**Table 3.** Ratio between the number of times the video lectures were viewed and the students' grades at the completion of the semester. Health undergraduates exposed to online education on nutritional therapy. Brasília, 2013.

		Number of times the lectures were viewed	Grades in items on enteral nutrition	Grades in items on parenteral nutrition	Final grade in the course
Number of times the video lectures were viewed	Spearman's correlation	1000	.489	.302	.622
	Sig. (1 tailed)	.	.000	.025	.000
	N	47	47	47	47

## Discussion

There is general agreement that a redirection of higher education in healthcare is needed and timely.<sup>1</sup> Training professionals for SUS (Brazilian Public Healthcare Service) requires partnerships between the areas of Education and Health, once researchers in the field of health education have a body of theoretical knowledge based on well-established principles of cognitive Psychology that allow the construction of more effective educational resources.<sup>22</sup>

The New Information and Communication Technologies enable the construction and deployment of innovative resources that may somewhat democratize teaching, increase the access of people to the study of socially important contents and skills besides motivating students and professionals to learn. It was found in this study that students who accessed the video lectures more times had a better performance in the exams and assessments. In addition, the media developed was well accepted by students. Indeed, the literature has shown that in well-structured courses video lectures produce the same degree of satisfaction as live classes.<sup>23</sup>

However, video lectures do not allow interaction between teachers and students. Therefore, face-to-face moments or strategies for the interaction between these actors are important to ensure the construction and systematization of knowledge by students.<sup>24</sup> In this perspective, the use of video lectures was considered as a support to live lectures. It was observed that the use of this resource provided positive results in terms of educational effectiveness, once it allowed better results for the students who used it to study and/or revise contents of the course.

In fact, other researchers also found positive results in the learning and satisfaction of students who accessed video lectures on diverse themes.<sup>25,26</sup> However, these data require further investigation once the variations in the grades depend on multiple factors, among them the students' profile (socio-demographic characteristics, preference for techniques of study or educational media, previous knowledge on the subject, time available to study) and the assessment tools used. In fact, technology cannot only be a tool for delivering content. In order to take effect, it should be firmly attached to the pedagogical design of a course or discipline.<sup>27,28</sup>

It would also be crucial to investigate whether the strategies used would have the same impact on healthcare professionals already working at SUS or other healthcare environments.

One of the limitations of this study was the lack of comparison between the students of current classes with previous ones, who did not have access to these materials. Such investigation is part of the research agenda of the authors of this article. It is also necessary to assess the cost effectiveness of using media to train and qualify professionals of the public healthcare network in Brazil.

## Conclusions

In this study it was observed that the use of video lectures is a useful strategy for training professionals who will be part of multi-skilled teams devoted to the care of people with special nutrition needs. Further researches could assess whether the same strategy would be beneficial to the training of professionals already working at SUS, and whether changes in the materials used would be necessary, such as modification of language, content, degree of complexity, length of the videos, as well as complementary strategies for discussion of the material, full understanding and grasp of the contents by the students and transfer of such knowledge to the work environment.

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## References

1. Frenk J, Chen L, Butta Z, Cohen J et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *The Lancet* 2010; 376(9756):1923-1958.
2. World Health Organization. *The World Health Report 2006: working together for health*. Geneva: WHO; 2006.
3. Haddad AE, Morita MC, Pierantoni CR, Brenelli SL, Passarella T, Campos FE. Formação de profissionais de saúde no Brasil: uma análise do período de 1991 a 2008. *Revista de Saúde Pública* 2010; 44(3):383-393.
4. Barbosa MA, Brasil VV, Sousa ALL, Monego ET. Refletindo sobre o desafio da formação do profissional de saúde. *Revista Brasileira de Enfermagem* 2003; 56(5):574-576.
5. Pierantoni CR, Varella TC, Santos MR, França T, Garcia AC. Gestão do trabalho e da educação em saúde: recursos humanos em duas décadas do SUS. *Physis. Revista de Saúde Coletiva* 2008; 18(4):685-704.
6. Costa, RKS, Miranda FAN. Formação profissional no SUS: oportunidades de mudanças na perspectiva da estratégia de saúde da família. *Trabalho, Educação e Saúde* 2009; 6(3):503-17.
7. Vieira ALSV, Amâncio Filho A. Apresentação. In: Brasil. Ministério da Saúde. *A dinâmica das graduações em saúde no Brasil: subsídios para uma política de recursos humanos*. Rio de Janeiro: Ministério da Saúde; 2006. p. 17-23.

8. Mendes EV. As redes de atenção à saúde. Brasília: Organização Pan-Americana de Saúde; 2011. 549 p. Disponível em: <http://apsredes.org/site2012/wp-content/uploads/2012/03/Redes-de-Atencao-mendes2.pdf>
9. Mendes EV. O cuidado das condições crônicas na atenção primária à saúde: o imperativo da consolidação da estratégia da saúde da família. Brasília: Organização Pan-Americana de Saúde. 2012. 512 p. Disponível em: [http://bvsmms.saude.gov.br/bvs/publicacoes/cuidado\\_condicoes\\_atencao\\_primaria\\_saude.pdf](http://bvsmms.saude.gov.br/bvs/publicacoes/cuidado_condicoes_atencao_primaria_saude.pdf)
10. Haddad J, Roschke M, Davini M. Educación permanente de personal de salud. Washington: OPS/OMS; 1994.
11. Ceccim RB, Feuerwerker L. O Quadrilátero da formação para a área da saúde: ensino, gestão, atenção e controle social. *PHYSIS Revista de Saúde Coletiva* 2004; 14(1):41-65.
12. Oliveira MAN. Educação à distância como estratégia para a educação permanente em saúde: possibilidades e desafios. *Revista Brasileira de Enfermagem* 2007; 60(5):585-589.
13. Brasil. Resolução RDC ANVISA nº. 63, 2000 jul 6. Aprova o Regulamento Técnico para fixar os requisitos mínimos exigidos para a Terapia de Nutrição Enteral. *Diário Oficial da União* 5 jul. 2000.
14. Instituto Brasileiro de Geografia e Estatística. Acesso à Internet e posse de telefone móvel celular para uso pessoal. Brasília: IBGE; 2005.
15. Terrion JL, Aceti V. Perceptions of the effects of clicker technology on student learning and engagement: a study of freshmen Chemistry students. *Res Learning Technology*. 2012; 20:16150.
16. Garrison JA, Kochi JK. Web-based distance continuing education: a new way of thinking for students and instructors. *Bull. Med. Libr. Assoc.* 2000; 88(3):211-217.
17. Corporation for Public Broadcasting. Television goes to school: the impact of vídeo on student learning in formal education. New York: 2004.
18. Brasil. Ministério da Saúde. Política Nacional de Alimentação e Nutrição. Brasília: Ministério da Saúde; 2012. 83 p.
19. Wong G, Grenhalgh T, Pawson R. Internet-based medical education: a realist review of what works, for whom and in what circumstances. *BMC Medical Education* 2010; 10(12):1-11.
20. Camargo LDVL, Garofalo S, Coura-Sobrinho J. Migrações da aula presencial para a videoaula: uma análise da alteração de mídiuim. *Quaesto*. 2011; 13(2):79-91.
21. Abbad GS, Zerbini T, Borges-Ferreira MF. Medidas de reação a cursos presenciais. In: Mourão L, Zerbini T. Medidas de avaliação em treinamento, desenvolvimento e educação: ferramentas para gestão de pessoas. Porto Alegre: Artmed; 2012. p. 78-90.
22. Whittingham JRD, Ruiter RAC, Castermans D, Huiberts A, Kok G. Designing effective health education materials: experimental pre-testing of a theory-based brochure to increase knowledge. *Health Education Research* 2008; 23(3):414-426.

23. Abdous M, Yoshimura M. Learner outcomes and satisfaction: a comparison of live vídeo-streamed instruction, satellite broadcast instruction, and face-to-face instruction. *Computers & Education* 2010; 55:733-741.
24. Sena EF. As videoaulas de um curso a distância: obstáculos didáticos/pedagógicos e suas implicações na aprendizagem do aluno. *Anais do Simpósio Internacional de Educação a Distância*; 10-22 set. 2012; São Carlos, SP: Universidade Federal de São Carlos; 2012. 13 p.
25. Kay R, Kletskin I. Evaluating the use of problem-based video podcasts to teach mathematics in higher education. *Computers and Education* 2012, 59:619-627.
26. Schreiber BE, Fukuta J, Gordon F. Live lecture versus video podcast in undergraduate medical education: a randomized controlled trial. *BMC Medical Education* 2010; 10:68-73.
27. Tamim RM, Bernard, RM, Borokhovski E, Abrami PC, Schmid RF. What forty years of research says about the impact of technology on learning: a second-order meta-analysis and validation study. *Review of Educational Research* 2011; 81(1): 4-28.
28. Cook DA, Hamstra SJ, Brydges R, Zendejas B, Szostek JH, Wang AT, Erwin PJ, Hatala R. Comparative effectiveness of instructional design features in simulation-based education: systematic review and meta-analysis. *Medical Teacher* 2013;35:e867-898.

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