

## TEACHING AND LEARNING IN A VIRTUAL ENVIRONMENT: NURSING STUDENTS' ATTITUDE

ENSINO E APRENDIZAGEM EM AMBIENTE VIRTUAL: ATITUDE DE ACADÊMICOS DE ENFERMAGEM

ENSEÑANZA Y APRENDIZAJE EN UN ENTORNO VIRTUAL: ACTITUD DE LOS ESTUDIANTES DE ENFERMERÍA

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### ABSTRACT

To assess a hypermedia system as a teaching strategy, learning in a virtual environment, and nursing undergraduate students' attitudes toward teaching about sexually transmitted diseases (STDs) in an online environment. This work was a quasi-experimental study, before-and-after, conducted with 28 undergraduate nursing students from a public university in the northeastern region of Brazil. The participants of the sample were selected by convenience. A hypermedia system, hosted at the SOLAR virtual environment, was made available for data collection. A validated instrument was used to assess prior knowledge (pre-test) and acquired knowledge (post-test) after the educational strategy. The Likert scale was used to assess the hypermedia system and students' attitudes. The data were analyzed using the Statistical Package for the Social Sciences (SPSS, version 20.0) and the Wilcoxon test, with a 5% significance level. Before starting the classes in the virtual environment, 67.9% of the students regarded their knowledge of STDs as limited. At the end of the modules, 78.5% of the students considered learning quite substantial. A statistical difference was observed in students' learning achievement, with an evident increase in the average number of correct answers in the post-test ( $p=0.00$ ). Most participants considered the hypermedia system and their attitude toward online learning appropriate. The hypermedia system for teaching and learning about STDs aided in the professional training process, stimulating a motivating learning process through multimedia resources. This system constitutes a complementary didactic resource for theoretical teaching in undergraduate nursing courses.

**Keywords:** Nursing Education; Learning; Educational Technology; Sexually Transmitted Diseases; Students, Nursing.

### RESUMO

Objetivou-se avaliar uma hiperídia como estratégia de ensino, a aprendizagem em ambiente virtual e a atitude de acadêmicos de Enfermagem para o ensino on-line das doenças sexualmente transmissíveis. Trata-se de estudo quase experimental, do tipo antes e depois, realizado com 28 acadêmicos de Enfermagem de uma universidade pública da região Nordeste do Brasil. Os participantes da amostra foram selecionados por conveniência. Para a coleta de dados, foi disponibilizada uma hiperídia hospedada no ambiente virtual SOLAR. Utilizou-se instrumento validado para verificação do conhecimento prévio (pré-teste) e conhecimento adquirido (pós-teste) após a estratégia educativa e escala de Likert para avaliação da hiperídia e atitude dos alunos. Os dados foram analisados no SPSS, versão 20.0. Aplicou-se o teste de Wilcoxon com nível de significância de 5%. Antes de iniciar as aulas no ambiente virtual, 67,9% dos alunos consideravam o seu conhecimento limitado sobre as infecções sexualmente transmissíveis. Ao fim dos módulos, 78,5% dos alunos classificaram o aprendizado como muito substancial e substancial. Houve diferença estatística no rendimento acadêmico dos alunos, com evidência de aumento na média de acertos do pós-teste ( $p=0,00$ ). A maioria dos participantes classificou a hiperídia e a sua atitude para a aprendizagem on-line como adequada. A hiperídia auxiliou no processo de formação profissional, estimulando uma aprendizagem motivadora mediante os recursos multimídias. Constitui-se em um recurso didático complementar para o ensino teórico na graduação em Enfermagem.

**Palavras-chave:** Educação em Enfermagem; Aprendizagem; Tecnologia Educacional; Doenças Sexualmente Transmissíveis; Estudantes de Enfermagem.

### RESUMEN

El objeto de esta investigación ha sido evaluar un sistema hipermedia como estrategia de enseñanza, el aprendizaje en entorno virtual y la actitud de los estudiantes de enfermería hacia la enseñanza virtual de enfermedades de transmisión sexual. Se trata de un estudio cuasi experimental, tipo antes y después, llevado a cabo con 28 alumnos de grado de enfermería de una universidad pública de la región noreste de Brasil. Los participantes de la muestra fueron seleccionados por conveniencia. La recogida de datos se realizó mediante la utilización de un sistema hipermedia alojado en el entorno virtual SOLAR. Para la comprobación del conocimiento previo (pre-prueba) y el conocimiento adquirido (post-prueba) después de la estrategia educativa fue utilizado un instrumento validado. Para la evaluación del sistema hipermedia y la actitud de los estudiantes fue utilizada la escala de Likert. Los datos fueron analizados mediante el paquete estadístico SPSS, versión 20.0 y la prueba de Wilcoxon con un nivel de significancia del 5%. Antes de comenzar las clases en el entorno virtual, el 67,9% de los estudiantes consideraba que su conocimiento sobre las enfermedades de transmisión sexual era limitado. Al final de los módulos, el 78,5% de los estudiantes clasificó el aprendizaje como muy sustancial. Hubo diferencia estadística en el rendimiento académico de los estudiantes con evidente aumento en el promedio

*de respuestas correctas en la post-prueba (p=0,00). La mayoría de los participantes clasificó el sistema hipermedia y sus actitudes hacia el aprendizaje virtual como adecuados. El sistema hipermedia para la enseñanza y aprendizaje de enfermedades de transmisión sexual ayudó en el proceso de formación profesional, estimulando un aprendizaje motivador mediante los recursos multimedia. Se trata de un recurso didáctico complementario para el aprendizaje teórico.*

**Palabras clave:** Educación en Enfermería; Aprendizaje; Tecnología Educativa; Enfermedades Sexualmente Transmisibles; Estudiantes de Enfermería.

## INTRODUCTION

Over a given time period, new technological innovations emerge in diverse areas of society, including education. With the advances in information and communication technology (ICT), improvements in the teaching-learning process have also become necessary. Thus, it is necessary for both faculty members and students to follow these modifications, keeping teaching practices up-to-date with new digital tools.<sup>1</sup>

The ICTs are being ever-increasingly used both for entertainment as well as for the production of knowledge. The digital objects, when associated with traditional teaching, consist of an enriching teaching strategy, with the characteristics of the dynamism of the teaching process and the active construction of knowledge. To achieve these characteristics, it is necessary to produce a coherent pedagogical planning, with a clear definition of the intended educational aims, through the application of digital tools.<sup>2,3</sup>

The use of ICTs in education promotes continuous learning in the user, with a better relationship among the participants, within a time frame scheduled by the participants themselves, in a diversity of locations, ensuring student autonomy and the freedom to study when one wishes.<sup>1</sup>

Learning through ICTs occurs in a virtual learning environment (VLE) defined by a computer system in virtual space with the aim of promoting educational activities. One such applied method in VLE is that of hypermedia, understood as the unification of diverse medias, such as hypertexts, links, audiovisual resources, discussion forums, among others. Hypermedia seeks to provide the user with the complete and interactive content, making the learning experience user friendly and pleasurable.<sup>4,5</sup>

Teaching in the field of healthcare, to a great extent, is traditionally performed through theoretical and practical classes, together with printed didactic materials. With the advances in technology, what has emerged is the possibility of upgrading the methods and materials of higher education. In this context, innovative resources, such as the computer and the internet, begin to aid in the construction of new horizons of learning.<sup>6</sup>

In Brazil, the use of ICTs in undergraduate nursing courses is based upon that set forth in the National Curriculum Guidelines and in Decree 4059/04 from the Brazilian Ministry of Education, which allows higher education institutions to make online courses available within their pedagogical and course curricula, limited to up to 20% of the total hours necessary to complete a degree.<sup>7</sup>

It is believed that online education strategies have great potential in the production of knowledge, even in the field of

healthcare. However, it is necessary to overcome some challenges, such as the technical preparation, the pedagogical quality, and the digital literacy of the professionals who will work in the field to offer a favorable context, as well as to improve the technological capacity of the higher education institutions towards implementing a transformational practice.<sup>8</sup>

Online teaching facilitates the updating of knowledge through the exchange of experience, interaction, and collaboration.<sup>9</sup> Nevertheless, despite the progress in online education, its delivery as a pedagogical strategy in in-house undergraduate courses in nursing is still quite precarious. One can see the lack of assessment of the digital materials offered to the students, which is in need of a more comprehensive overview for these users.<sup>2,10</sup>

By contrast, few studies have been published about the assessment of nursing students' learning and digital strategies for the teaching of sexually transmitted diseases (STDs) during a nurse's education. STDs are among the most common public healthcare problems in Brazil and the world today. They are considered the main facilitator of the sexual transmission of the Human Immunodeficiency Virus (HIV) and, when not diagnosed and treated in time, can evolve into more serious complications. In the case of a pregnancy, there is the possibility of placing the fetus at risk, which can cause premature birth, congenital malformation, and miscarriages.<sup>11</sup>

Nurses possess competencies and educational strategies in healthcare that can be used in the prevention and control of STDs.<sup>3</sup> However, one study that aimed to identify the level of knowledge among undergraduate nursing students regarding the factors related to STDs showed the need to provide greater investments in the education of our youth to promote their health and prevent STDs.<sup>12</sup>

Taking into account that presented above, this study aimed to assess a hypermedia as a teaching strategy, learning in a virtual environment, and the attitude of nursing students towards online classes about STDs. The results are intended to promote reflection on the teaching-learning process about the use of technological resources in the construction of specific knowledge for nursing students.

## METHOD

This work was a quasi-experimental study, before-and-after, conducted at a federal public university in the northeastern region of Brazil, during the first semester of 2013. The participants of

the sample were selected by convenience. The following inclusion criteria were adopted: students from the undergraduate course in nursing and duly registered in the course *Nursing in Gynecology and Obstetrics*. It is important to note that there was no sample loss.

For data collection, a hypermedia, validated in technical and content aspects, was made available for theory classes on STDs. The hypermedia consisted of seven modules, totaling 20 total course hours, distributed in the following content: epidemiological aspects of STDs, main characteristics of STDs, nursing care in STD (gynecological appointments), syndromic management of STDs, and the handling of STDs in primary healthcare. The modules were constructed with interactive tools, making hypertexts, links, videos, podcasts, games, and discussion forums (case studies) available to aid in the learning process.

The hypermedia was hosted in the SOLAR virtual environment. This teaching platform was developed by the Federal University of Ceará (UFC) to foster learning; it is user friendly and is compatible with web browsers. The SOLAR environment allows one to use synchronous and asynchronous tools for student-student and student-professor communication. Its access is possible by the student registering a login and password and being accepted by the professor responsible for the course/specific classes.

Two in-house meetings were held in the IT laboratory of the university. The first meeting included the presentation of the teaching strategy, the registration of the students, and the adapting of the hypermedia to the virtual environment. A questionnaire on the characterization of the students and the pre-test was also applied.

It should be noted that, to verify the previous knowledge (pre-test) and the acquired knowledge (post-test) after the educational strategy, a validated questionnaire,<sup>3</sup> consisting of 24 multiple choice questions about the subject-focus, was applied. The variable of the questionnaire treated the main characteristics of STDs, the syndromic management of STDs in basic healthcare, and the gynecological nursing consultation.

In the second in-house meeting, the post-test and a Likert-type scale questionnaire were applied to assess the hypermedia as a teaching strategy and the nursing students' attitudes regarding online learning.

To achieve this, the following variables were selected: interaction and stimulus, interest and motivation to learn, dedication, discipline and time management, communication tools, didactic material, and the student's role in the learning process.

The following concepts were applied to each of the above criteria: (1) highly appropriate; (2) considerably appropriate; (3) moderately appropriate; (4) somewhat appropriate; (5) not appropriate.

Next, the weighted average of the concepts was calculated, attributing the value of 1 to concept 1, 0.75 to concept 2, 0.50 to concept 3, 0.25 to concept 4, and 0 to concept 5. The items with a weighted average of greater than 0.80 were classified as appropriate;

those with a weighted average of between 0.80 and 0.50 were considered moderately appropriate; and those with a weighted average of less than 0.50 were considered inappropriate.

Students had free access to the hypermedia over a one-week period, the time between in-house meetings. During this period, the student could connect to the online teaching platform from any computer with access to internet, at home or at the university, according to interest and availability in one's schedule. During the dispersion time, a tutor was available to answer pertinent questions on the subject and about the activities of the online module.

To analyze the data, a databank was created in the *Microsoft Office Excel 2007* program and exported to the *Statistical Package for the Social Sciences* (SPSS), version 20.0, statistics software. Descriptive and inferential statistical analyses were performed. The absolute and relative frequencies of the analyzed variable were also calculated.

The Wilcoxon test (paired samples) was applied to compare the averages of the students' scores upon assessment (pre-test and post-test). A significance level of 5% ( $p < 0.05$ ) was adopted.

The study following the ethical principles of research involving humans, according to that set forth in Decree 466, ratified on December 12, 2012, from the Brazilian National Health Council. This study was approved by the Research Ethics Committee from UFC, with authorization logged under protocol number 191.533/13.

## RESULTS

This study counted on the participation of 28 undergraduate nursing students. The majority believe that they are responsible for their own learning (78.6%) and that they are free to search for knowledge (82.14%). All of the students recommended the use of the virtual learning environment as a teaching strategy in undergraduate nursing courses, and 92.9% would be willing to use other educational software.

Of the participating students, 67.9% considered their knowledge in STDs before beginning classes in the virtual environment to be limited. At the end of the modules in the virtual environment, 78.5% of the students classified their learning about STD as quite substantial or substantial.

To assess the learning from the content, a comparison was made between the number of correct answers from the pre-test and the post test. A statistically significant difference was observed in the students' academic performance, as evidenced by the increase in the average number of correct answers in the post-test ( $p = 0.00$ ), showing that they had in fact learned the content (Table 1)

The results of the undergraduate nursing students' assessment of the hypermedia is shown in Table 2. The outcome shows that all of the assessed items obtained a weighted average of greater than 0.80 and were therefore classified as appropriate.

appropriate by the students. The results of the students' assessment of the hypermedia indicates a good acceptability and satisfaction with the teaching strategy.

Table 3 highlights the students' assessment as regards their attitudes towards online learning. It could be observed that only the items of "organization of time" and "self-discipline" were assessed as moderately appropriate; the other items were considered appropriate.

Table 1 - Result of academic performance before and after the application of the hypermedia in the virtual environment – Vitória de Santo Antão, Pernambuco, Brazil, 2014

Academic performance (number of correct answers)		Sample	p-value <sup>1</sup>
Pre-test	F	28	0.000
	%	100.0	
	Mode	11	
	Median	12.00	
	Arithmetic mean	12.21	
	Standard deviation	2.833	
Post-test	F	28	
	%	100.0	
	Mode	23	
	Median	20.0	
	Arithmetic mean	18.86	
	Standard deviation	4.034	

1-Wilcoxon Test.

Table 2 - Nursing students' assessment of the hypermedia as a teaching-learning strategy – Vitória de Santo Antão, Pernambuco, Brazil, 2014

Assessed items	Weighted average
<b>Interaction and stimulus</b>	
The environment facilitated interaction and interest in the subject	0.91
The environment proposes learning scenarios	0.91
The hypermedia allows one to navigate freely through the content	0.96
Relevance of the activities and meeting of proposed aims	0.96
Facility of access to modules	0.92
The hypermedia prompts change in behavior and attitudes	0.92
<b>Communication tools</b>	
The environment encourages the exchange of information with classmates and professors	0.91
Pertinence of the links to the content	0.96
Use of e-mail, forums, and portfolios	0.95

Continues...

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Table 2 - Nursing students' assessment of the hypermedia as a teaching-learning strategy – Vitória de Santo Antão, Pernambuco, Brazil, 2014

Assessed items	Weighted average
<b>Didactic material</b>	
The hypermedia is self-explanatory and easy to understand	0.97
Appropriateness of the division of content into modules	0.96
Coherence of presented information	0.96
Easily understandable written material	0.99
Appropriateness of colors and font sizes	0.96
Relevance and clarity of the student guide	0.97
Correlation between the medias and the content to complement the texts	0.97

Table 3 - Nursing students' attitude towards online teaching-learning – Vitória de Santo Antão, Pernambuco, Brazil, 2014

Assessed items	Weighted average
<b>Interest and motivation to learn</b>	
Motivation to use the virtual learning environment	0,84
Doing complementary readings and note-taking about the course content	0,81
Capacity to study using the virtual environment	0,90
<b>Dedication, discipline, and time management</b>	
Organization of time for online activities	0,76
Self-discipline for online classes	0,77
Access to classes with the proposed regularity	0,81
<b>Role of the student in the learning process</b>	
Believes he/she has the freedom to construct his/her own knowledge	0,84
Believes that he/she is responsible for his/her own learning	0,86

## DISCUSSION

Nurses, as a healthcare educators, need to receive daily upgrades in their field of work, especially in approaches to STDs in primary healthcare, given that flawed healthcare in the community can contribute to perpetuating the chain of transmission of sexual infections.

In this sense, nurses must offer the population comprehensive and high quality care, with clear information on sexual infections, developing healthcare activities of promotion and prevention.<sup>13</sup>

Learning to use the syndromic approach to STDs during the undergraduate course is important to a nurse's education. Based on that presented above, it can be understood that the hypermedia proved to be a favorable resource for theory classes on STDs, which can in turn aid the nursing students in the construction of this type of knowledge.

The use of virtual learning environments in a coherent manner facilitates the construction of knowledge, providing the participant with the freedom to search for and construct knowledge. This type of learning environment can also aid in developing other abilities, such as the skill to argue one's point and the relationship with other members of the group, thus making the student more well-prepared for the job market.<sup>10</sup>

The results of learning presented in this study also corroborate with findings from other studies that used digital mediums in higher education learning. One study, which aimed to compare the absorption of knowledge concerning the technique of urinary catheterization before and after the application of the educational software revealed an increase in knowledge on the part of the participants after the use of digital tools, which was thus considered useful in the teaching-learning process with undergraduate nursing students.<sup>14</sup>

In another study, the analysis of the pre and post-test averages allowed the researchers to observe, after educational intervention, the influence of a virtual learning medium with positive results on the learning process of nursing students as regards evaluations of acute pain. In addition, the application of technology contributed to fill in the gap in the teaching of the proposed theme, and was classified as an effective and promising educational method. In the opinion of the students, the teaching strategy was particularly successful due to its easy access, the value given to access regardless of time and space, and autonomy in the learning process.<sup>15</sup>

Another study, which constructed and validated the digital medium as regards physical exams showed the use of computer technologies as a support strategy for undergraduate nursing students, which can be used to provide support to the learner, in turn maximizing the learner's results.<sup>16</sup>

In this context, the hypermedia stands out due to its possibility of using a wide range of sensorial channels, combining texts, images, sound, and videos, in turn creating a new communicational modality in the digital medium.<sup>17</sup> It is recognized as a stimulating learning tool through the exchange of experiences, thus facilitating the upgrading of teaching strategies, without forcing students to interrupt their daily activities.<sup>9</sup>

The present study considered the students' opinions to be positive as regards the pedagogical practice concerning vital signs associated with digital technologies in in-house nursing classes. One factor that most stood out was the easy access to the content and the easy communication among classmates through cooperation. The students felt that the lack of the physical presence of the professor, when compared to the conventional teaching methods, was actually a favorable aspect towards one's autonomy to manage one's own didactic activities, demanding greater discipline and organization from the student.<sup>18</sup>

In the virtual environment, the student is who constructs his/her own knowledge. This represents the learning subject,

with support from the professor, which helps the student to advance and to stimulate one's curiosity. The professor follows the process of knowledge construction, paying close attention to the peculiar manner in which each student learns, thus playing the role of the mediator, who must assess each student by his/her capacity to understand and his/her own production.<sup>19</sup>

The strategies for online teaching offer the students autonomy in their search and construction of their own knowledge with a flexibility of time schedules, a point which is quite weak in the traditional teaching model.<sup>20</sup> This learning autonomy made possible through online teaching can be maximized when associated with conventional teaching methods.

Students from traditional teaching, who assess motivational aspects of online educational materials, reported a high satisfaction and recommended the organization of didactic resources as an indispensable variable for user motivation and learning. In general, the planning of available activities in VLEs stimulates student learning, giving them the incentive to return to the virtual environment for new lessons.<sup>21</sup>

However, it is important to note that the motivation to use the virtual learning environment must be accompanied by user characteristics. In the online method, students themselves must develop the ability to search for knowledge; they must learn to learn and have the commitment to do the proposed activities.

One study, which analyzed the main dimensions of resistance to online courses in corporate education informed that the expectation of performance and self-efficacy, respected as the degree of one's own ability to learn alone, directly influenced the resistance to online courses. In this sense, the lack of effort on the part of the student, the absence of discipline with the virtual activities, and the difficulties with time management can cause resistance and poor results in the learning process.<sup>22</sup>

By contrast, it should be noted that the success of the virtual student is directly linked to the tool used, the manner in which the professor conducts the group, and, most importantly, by the motivation to do online activities and the availability of necessary resources for the desired interactivity.<sup>23</sup>

It is evident that when there is a joining of the in-house method with online teaching, through the interaction of virtual activities and in-house theory classes, what emerges is a strategy that is more efficient towards achieving educational aims. Therefore, the use of hypermedia can be considered a complementary digital tool for in-house teaching strategies, which can facilitate student learning.<sup>10,24</sup>

## CONCLUSION

The hypermedia was well-accepted by the nursing students, who gave a positive assessment in all of the researched variables, showing that it is method that can facilitate the learning process.

At the end of the modules in the virtual environment, the knowledge learned about STDs was classified by the students as quite substantial and substantial. Evidence of the learning of the course content was observed through the statistical difference in the average number of correct answers between the pre and post-tests.

One factor that stood out was that the structure of the content of the hypermedia in non-linear modules allowed the student to navigate freely through the subject, in addition to providing flexibility to the each student's own study rhythm. Both the management and interactivity were considered to be user friendly. As the hypermedia was available on the internet, the access to the content became flexible, according to the students' time availability and interest.

In the assessment regarding the student's attitude about online learning, the students classified the "organization of time" and "self-discipline" as moderately appropriate for online teaching, possibly influenced by the study workload demanded by the disciplines from the conventional method offered by the university to the participating students.

It is therefore necessary to develop other studies that assess the variable of "organization of time" and "self-discipline" of the nursing students to better take advantage of the didactic digital resources in the online teaching-learning process. The findings presented here may have a wide range of implications for nursing, especially as concerns teaching practices. The hypermedia about STDs proved to be helpful in the professional educational process, stimulating motivating learning through multimedia resources, and thus represents a complementary didactic resource for theoretical teaching in undergraduate nursing courses.

In this sense, the inclusion of teaching practices in virtual environments as a space in which to divulge didactic materials in disciplines from the in-house teaching of undergraduate nursing courses is favorable, given that the VLEs allow for the interactions from traditional classes to be expanded.

It is recommended that other similar investigations be carried out using other contemporaneous technological resources, such as blogs, chats, video classes, homepages, interactive e-books, webquests, educational applications, digital games, software, and other virtual environments, in an attempt to confirm the impact of these tools on learning and possible improvements in the quality of teaching about STDs in undergraduate nursing courses.

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