Impact of curricular change on the perception of the educational environment by nursing students

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Objective. This study sought to evaluate the impact of curricular change on the perception of the Educational Environment (EE) in nursing students. **Methodology.** This was a cross-sectional study. Two consecutive cohorts were evaluated during the second year, entering 2010 (N: 58) and 2011 (N: 57) for former and new curriculum, respectively. A sociodemographic survey and perception of the EE was applied through the Dundee Ready Educational Environment Measure (DREEM) questionnaire. **Results.** No differences were detected in the sociodemographic variables between the cohorts. Both groups evaluated EE *more positively than negatively*. The total average score of the perception of the EE by the 2010 cohort was of 132 points and by the 2011 cohort of 126 points, a statistically significant difference. Upon analyzing the survey items, it was observed that poorer perception exists of the learning atmosphere and of the social environment, as well as poorer assessment of the academic skills in the 2011 cohort compared to the 2010 cohort. The good preparation the students are receiving for the profession and the relevance of the assignments they are learning are considered strengths by the students from both groups. **Conclusions.** In spite of how positive the curricular changes could seem, perception of the EE in both cohorts does not reach the *excellent* category. Before any changes are made to the curriculum, it is indispensable to take into account how the academic load might affect the students.

Key words: curriculum; nursing evaluation research; students, nursing.

Impacto del cambio de malla curricular en la percepción del ambiente educacional en alumnos de enfermería

Objetivo. Evaluar el impacto del cambio curricular en la percepción del Ambiente Educacional (AE) en alumnos de enfermería. **Metodología.** Estudio transversal. Se evaluaron dos cohortes consecutivas en segundo año, ingreso 2010 (N: 58) y 2011 (N: 57) para currículo antiguo y nuevo respectivamente. Se aplicó

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una encuesta sociodemográfica y de percepción del AE mediante el cuestionario *Dundee Ready Educational Environment Measur*e (DREEM). **Resultados.** No hubo diferencias en las variables sociodemográficas entre las cohortes. Ambos grupos evaluaron el AE *más positivo que negativo*. El puntaje total promedio de la percepción del AE de la cohorte 2010 fue de 132 puntos y el de la cohorte 2011 de 126 puntos, diferencia que fue estadísticamente significativa. Al analizar los ítemes de la encuesta se observó que existe una peor percepción de la atmósfera de aprendizaje y ambiente social, como también una peor evaluación de las habilidades académicas en la cohorte 2011 comparada con la de 2010. La buena preparación que están recibiendo para la profesión y la relevancia de las materias que están aprendiendo son considerados como fortalezas por los alumnos de los dos grupos. **Conclusión.** A pesar de lo positivo que pudieran parecer los cambios en el currículo, la percepción del AE en ambas cohortes no alcanza la categoría *"excelente"*. Es indispensable que se estudie la carga académica que significará para los estudiantes cualquier modificación que se haga en la malla curricular.

Palabras clave: curriculum; investigación en evaluación de enfermería; estudiantes de enfermería.

Impacto da mudança de malha curricular na percepção do ambiente educacional em alunos de enfermagem

Objetivo. Avaliar o impacto da mudança curricular na percepção do Ambiente Educacional (AE) em alunos de enfermagem. Metodologia. Estudo transversal. Avaliaram-se dois coortes consecutivas em segundo ano, rendimento 2010 (N: 58) e 2011 (N: 57) para currículo antigo e novo respectivamente. Aplicou-se uma enquete sócio-demográfica e de percepção do AE mediante o questionário Dundee Ready Educational Environment Measure (DREEM). Resultados. Não teve diferenças nas variáveis sócio-demográficas entre os coortes. Ambas grupos avaliaram o AE mais positivo que negativo. A pontuação total média da percepção do AE do coorte 2010 foi de 132 pontos e do coorte 2011 de 126 pontos, diferença que foi estatisticamente significativa. Ao analisar os itens da enquete se observou que existe uma pior percepção da atmosfera de aprendizagem e ambiente social, como também uma pior avaliação das habilidades acadêmicas no coorte 2011 comparada com a de 2010. A boa preparação que estão recebendo para a profissão e a relevância das matérias que estão aprendendo são considerados como fortalezas pelos alunos dos dois grupos. Conclusão. Apesar do positivo que pudessem parecer as mudanças no currículo, a percepção do AE em ambos coortes não atinge a categoria "excelente". É indispensável que para qualquer modificação que se faça na malha curricular, estude-se o ônus acadêmico que significará para os estudantes.

Palavras chave: currículo; pesquisa em avaliação de enfermagem; estudantes de enfermagem.

Introduction

During 2010, the School of Nursing at Universidad de los Andes in Santiago de Chile modified its curriculum to: i) incorporate the Chilean system of transferable credits (SCT-Chile, for the term in Spanish), which converts students' academic load into credits comparable among Chilean universities, ii) include the General Study Plan (PEG, for the term in Spanish), and iii) introduce Minor. These changes implemented in our University sought to create greater flexibility in career curriculums, increase integral formation, and improve students' academic achievements. This curricular grid was initiated with the 2011 cohort of students. From a formal point of view, the main changes introduced were: incorporation of the credit system and measurement of the student workload per subject, leaving it balanced at around 30 credits per semester, semesterization of annual assignments, diminish the number of pre-requisite assignments, relocation of some

courses within the grid, and incorporation of PEG assignments (8 assignments from the areas of Philosophy and Theology, Sciences, Arts and Literature, and History and Current Affairs) and Minor assignments (disciplinary concentrations different from the career of origin). Although these changes may seem positive and congruent in light of the diagnostic carried out in the strategic planning at the University and the School of Nursing, it is necessary to adequately objectify the perception of the educational environment (EE) by students, to gain awareness of the dimension of the effects of the curricular change made.

Studies have highlighted the role of the EE on the academic performance of students in general and on students from the health area in particular.[1, 2] Said studies indicate that students' perceptions of the educational environment have direct relationship and relevance in their compliance of academic achievements and in their wellbeing.[3-5] Evidence shows that students who perceive the educational climate more favorably achieve higher academic success than those who perceive it negatively. In turn, favorable EE permits a higher proportion of students to have academic success and generates greater satisfaction in them.[6] This results in decreased student anguish and stress, as well as diminished dropout rates,[1] given that high levels of stress in nursing students can affect memory, concentration, motivation, and capacity to solve problems, giving way to diminished learning, adaptation, and academic performance.[7] One of the factors generating a favorable EE is the existence of student-centered curricular grids.[1, 8] This has led numerous institutions to systematically evaluate the EE and which along with other parameters, permit timely introduction of the necessary curricular and methodological changes.

Different instruments are available to evaluate the EE in health careers, in the classroom and in clinical scenarios[9] The broadest experience in these evaluations has been carried out in Anglo-Saxon countries and by the careers in Nursing and Medicine. One of the reliable instruments in assessing the perceptions of undergraduate students is the Dundee Ready Educational Environment Measure (DREEM).[9] This instrument has been translated into Spanish, Portuguese, Arabic, and Chinese, among others.[10] It has 50 questions, divided into five areas: *students' perception on: learning, professors, their academic skills, the learning atmosphere, and the social environment*. Roff [9] recommends using this instrument to generate the profile of a given career and/or institution by identifying its strengths and weaknesses, performing comparative analyses of students' perceptions within the same institution or among institutions, evaluate the correlation between the perception of the educational environment and academic achievements of students and the use of this survey as a tool that permits identifying good students and those at risk.

Some of the experiences in applying this survey in the classroom were published by O´Brien et al.,[11] in 2008 in Singapore; they sought to objectify the impact of the changes on nursing students' perceptions of the EE in light of curricular modifications, concluding that the DREEM survey was reliable and that it adequately reflected the changes produced. In Chile, this instrument has been applied successfully in the School of Medicine at Pontificia Universidad Católica de Chile, [12] concluding that the survey's Spanish version is reliable (Cronbach's alpha 0.91) and that it could be a useful tool to evaluate students' perceptions on the educational climate in different national schools of medicine and within the Latin American context. This research applied the DREEM survey on two cohorts of nursing students: one with the former curricular grid and another with the new curricular grid, to assess the impact of the curricular change on the perceptions of the EE by students from the School of Nursing. The results from this study will be used as a quantitative assessment element of the changes introduced, which will permit nourishing the continuous improvement process within the School's quality assurance policy. Likewise, with the generation and dissemination of new knowledge, we seek to contribute to the national and Latin American academic community.

Methodology

This work corresponds to a cross-sectional study. These preliminary results belong to the second phase of a study in progress, which encompasses measuring EE perceptions during the 2nd, 3rd, and 4th years of the career. The study population involved 2nd-year students from the Nursing career at Universidad de los Andes in Santiago-Chile. The first cohort comprised 85 students from the 2010 generation with the former curriculum. The second cohort included 81 students from the 2011 generation with the new curriculum. Measurements were made in both groups during their second year of their careers.
Exclusion criteria defined students who did not belong to the generation of origin (repeaters); besides those who entered via special admission.

Variables The independent variable was the type of curriculum the student was enrolled in the career. This was considered a dichotomous qualitative variable, where its indicator was new or former curriculum. The principal dependent variable was perception of the EE, considered a discrete quantitative variable. It was measured through the DREEM[9] questionnaire, which has 50 items, with options for Likert-type responses offering five alternatives: 4 = completely agree; 3 = agree; 2 = uncertain; 1 = disagree, and 0= completely disagree. This scale has five domains: *students' perceptions on learning* (12 items), *students' perceptions on professors* (11 items), *students' perceptions on their academic skills* (8 items), *students' perceptions on the learning atmosphere* (12 items), and *students' perceptions on the social environment* (7 items). Each domain is interpreted according to the score obtained, thus: *Perception on learning*: 0 – 12: very poor, 13 – 24: teaching is perceived negatively, 25 – 36: a rather positive perception of teaching, 37 – 48: teaching is very well evaluated; *Students' perceptions of professors*: 0 – 11: abysmal; 12 – 22: need educational training, 23 – 33: aimed in the right direction, 34 – 44: model teachers; *Perception on their academic skills:* 0 – 8: sense of total failure, 9 – 16: many negative aspects, 17 – 24: feeling more on the positive side, 25 – 32: sure of the academic future; *Perception of the environment*: 0 – 11: a poor environment, 12 – 24: many aspects need to change, 25 – 36: a rather positive attitude, 37 – 48: good general perception; *Social perception*: 0 – 7: miserable, 8 – 14: it is not a good place, 15 – 21: not such a bad social environment, 22 – 28: very good social environment.

An item's average score above 3 is related to a positive perception of the EE and it is considered a strength; values between 2 and 3 are considered neither strengths or weaknesses, but can be opportunities for improvement; and scores below 2 are considered weak areas.[13] The global score is obtained through the sum of the response values of the 50 items, with the corresponding score above 200. A global score from 0 to 50 indicates "very poor EE", from 51 to 100: "EE with many problems", from 101 to 150: "EE more positive than negative", and from 151 to 200: "excellent EE". Other independent variables registered were: gender, age, marital status, student's work activity, type of educational establishment for middle school, if student had enrolled in previous studies, what was the student's region of origin, and the score on the university selection test (PSU, for the term in Spanish) weighted for the career and average PSU along with the year entering higher education.

Collection of information. Information from both cohorts was collected in classrooms through a questionnaire answered by the students.

Ethical aspects. The study was approved by the Ethics Committee at Universidad de los Andes and the participants signed an informed consent prior to being included in the project. Student anonymity was maintained at all times by using a code and ensuring confidentiality of the information gathered, which was tabulated and safeguarded.

Data analysis. The STATA 10 statistical program was used. To characterize the study population, the following measures of central tendency and dispersion were used to describe the quantitative variables and frequency measurements to describe the qualitative variables. To assess if significant differences existed in the perception of the EE between both cohorts, the t test was used to compare the total mean scores and scores per dimension of the DREEM. Differences among groups for sociodemographic variables were worked with the χ^2 test. Differences were considered statistically significant with a value of $p < 0.05$.

Results

The 2010 cohort of 60 students was reduced to 58 students (96.7%) because of a repeat student and another one who was absent on the day of the measurement. The 2011 cohort of 61 was reduced to 57 students (93.4%) due to the absence of four students on the day of the measurement. The mean age for the students was 20 years, without statistical difference between groups ($p = 0.395$). Both cohorts were mostly comprised by single women. Only 12.1% of the students from the 2010 cohort and 21.1% from the 2011 cohort reported being gainfully employed at the time of the survey, a difference that was not statistically significant. Most of the students from both cohorts did not present prior studies that could improve their expectations regarding this new university experience. No statistically significant differences were detected in the PSU admission average between both groups of students (2010 cohort: 645.32 ± 29.4; 2012 cohort: 639.58 ± 23.5, p value = 0.257). Table 1 shows the characteristics of the students from both cohorts.

The total average score of EE perception by the 2010 cohort was 132±17.2 points, and by the 2011 cohort it was 126±17.4 points, which is interpreted as a *more positive than negative* perception of the EE; however, a statistically significant difference exists in the global score between both cohorts ($p = 0.033$), with the 2010 cohort showing the best perception. In the analysis by domain, perception of their academic skills was evaluated by both cohorts as *feeling more on the positive side;* although the 2011 cohort reported feeling *more insecure about the academic future* than the 2010 cohort, a statistically significant difference. Additionally, they reported a *rather positive* environment for learning, with statistically significant differences in favor of the 2010 cohort, and catalogued the social environment as *not that bad*, with the 2011 cohort maintaining a poorer perception. Table 2 shows the average score for each of the areas evaluated by the DREEM questionnaire.

In the analysis per item, if the result was below 2, it is considered a problematic aspect that should be examined. If the average is above 3, these reflect aspects that contribute to a good EE. In the 2010 cohort, the score obtained in nine of the 50 items (18%) evidence problematic aspects from the students' point of view, and 16 of the 50 items (32%) reveal points that contribute to a good EE. In the 2011 cohort, 20% of the items are recognized as problematic areas and 30% as areas that favor good EE (Tables 3 and 4).

Table 1. General characteristics of participating students according to study cohort

Variables	2010 cohor n (%)	2011 cohort n (%)	p value
Female gender	53 (91.4)	52 (91.2)	0.708
Marital status			
Single	55 (94.8)	55 (96.5)	0.985
Common-law	2 (3.4)	1 (1.8)	
Without data	1 (1.7)	1 (1.8)	
Region of origin			
Metropolitan of Santiago	47 (81.0)	46 (80.7)	0.979
VI	4 (6.9)	4 (7.0)	
Without data	7 (12.1)	7 (12.3)	
Employment situation			0.303
Student	49 (84.5)	44 (77.2)	
Worker and student	7 (12.1)	12 (21.1)	
Without data	2 (3.4)	1 (1.8)	
Middle school			
Private	33 (56.9)	27 (47.4)	0.503
Subsidized	17 (29.3)	20 (35.1)	
Municipal	7 (12.1)	10 (17.5)	
Without data	1 (1.7)	0 (0.0)	
Prior studies			
Yes	13 (22.4)	15 (26.3)	0.626
No	44 (75.9)	42 (73.7)	
Without data	1 (1.7)	0 (0.0)	
Extracurricular activity			
Yes	16 (27.6)	11 (19.3)	0.372
No	41 (70.7)	43 (75.4)	
Without data	1 (1.7)	3 (5.3)	

Table 2. Perception of the EE by students from the 2010 and 2011 cohorts

Dimension	2010 cohort			2011 cohort			
	Mean	SD	Min- Max*	Mean	SD	Min- Max	p value
Learning	29.9	5.6	16 - 41	30.4	4.6	17-39	0.623
Professors	29.0	5.7	16 - 39	30.3	4.5	18-39	0.203
Academic skills	24.1	3.3	16 - 31	22.6	3.7	13-31	0.020
Learning atmosphere	30.3	5.0	20 - 42	26.7	5.4	12-37	<0.001
Social environment	18.1	3.2	11 - 24	16.6	3.3	8-23	0.020

Table 3. Items from the DREEM questionnaire considered problem areas

Item	2010 cohort	2011 cohort
There is a good support system for registrars who get stressed	Yes	Yes
The atmosphere is relaxed during consultation teaching	Yes	Yes
I am rarely bored in this course	Yes	Yes
The teaching over emphasizes factual learning	Yes	Yes
The teaching is too teacher centered	Yes	No
The registrars irritate the course organizers	Yes	Yes
I am too tired to enjoy this courses	No	Yes
The course organizers are authoritarian	No	Yes
Cheating is a problem in this course	No	Yes
I am able to memorize all I need	No	Yes
The enjoyment outweighs the stress of studying	No	Yes

Table 4. Items from the DREEM questionnaire considered strengths

Item	2010 cohort	2011 cohort
The course organizers are well prepared for their teaching sessions	Yes	Yes
The course organizers espouse a patient centered approach to consulting	Yes	Yes
I am confident about passing this year	Yes	No
The teaching is registrar centered	No	Yes
I have good friends in this course	Yes	Yes
The teaching helps to develop my competence	Yes	Yes
The course organizers appear to have effective communication skills with patients	Yes	Yes
My social life is good	Yes	Yes
I feel I am being well-prepared for my profession	Yes	Yes
Last year's work has been a good preparation for this year's work	Yes	Yes
I have learned a lot about empathy in my profession	Yes	Yes
The course organizers provide constructive criticism here	Yes	No
I feel comfortable in teaching sessions socially	Yes	Yes
The course organizers give clear examples	Yes	Yes
The course organizers are well prepared for their teaching sessions	Yes	Yes
Much of what I have to learn seems relevant to a career in healthcare	Yes	Yes
Physical environments at the School are pleasant	Yes	Yes

Discussion

Upon analyzing the sociodemographic characteristics, it can be noted that both cohorts are similar. Said cohorts are mainly comprised of single women, 20 years of age, whose cutoff score on admission to the career was 645 points (the cutoff score for Schools of Nursing at Chilean universities attached to the Sole Admissions System for 2013 was 587 points), their principal activity was that of being students, and are mainly from the metropolitan region. Similar to the study

by Bakhshi *et al*.,[4] who measured EE perception in nursing students from an Iranian university, perception of the educational environment was considered with more positive aspects than negative. However, our study found a statistically significant difference in the global score between both groups. The 2011 cohort obtained 6 points less, explained by a higher number of items considered as problem areas in the analysis per dimension. Our results differ from those found by Aghamolaei *et al*.,[5] Said *et al*.,[8] and Wang *et al*.,[14] who reported better perception of the educational environment in students enrolled with innovative curriculums with respect to those studying with a traditional curriculum.

The results obtained in our study could be because the calculation of the academic credits of the different assignments of the new curriculum was carried out mainly based on a professor-centered learning methodology, which implies less hours of personal work of the student. However, in parallel manner and without articulation with the implementation of the curricular changes, initiatives aimed at enhancing student self-learning were introduced in some courses and in isolated manner. These methodological innovations imply a period of adjustment of time within the organization and a higher number of hours of student individual work, which would explain that the 2011 cohort had reported an academic load with negative impact in its EE perception. This less favorable appreciation is evidenced during the analysis per dimension, where the students' assessments of their own academic skills, the learning environment, and the social environment, diminish with statistic significance in the 2011 cohort.

Although it is true that these results cannot be considered definite, given that they are part of an on-going research, they do represent an opportunity for an eventual revision of the calculation of the credits for the 2nd-year assignments that considers a period of adaptation to changes introduced. However, this does not mean delaying academic and emotional support to students who feel stressed.

Upon analyzing the items considered problem areas of the EE, we find similar results to those reported by Bakhshi *et al.*[4] and Aghamolaei *et al.*,[5] where the lack of university support to students enduring stress, the sense that students irritate teachers, excess emphasis on learning details, a not very relaxed clinical learning system, and boredom in classes are considered problem areas requiring research for subsequent intervention. Other aspects considered weaknesses (reported only by the 2011 cohort) would be that they are too tired to enjoy the courses, that the teachers are very authoritarian, that copying during exams is a problem, and that they are not capable of memorizing everything. These aspects would be explained by greater speed in implementing the new curriculum against the methodological changes. Hence, it seems necessary to continue on a change of paradigm in the learning concept by professors; a challenge we have initiated with their continuous formation in education and the creation of a teaching staff committee that leads methodological changes in tune with the new curriculum.

Also, when evaluating issues considered strengths, the positive evaluation students have of their professors is highlighted; they consider they are well-prepared for their classes and are competent in the clinical scenario. Additionally, they feel socially comfortable in classes and with their classmates. They also value the good preparation they are receiving for the profession and the relevance of the assignments they are learning. This evidences that the School has good professors, experts in the assignments they teach; however, they require delving into their methodological formation. Another aspect worth mentioning is that the students report that the School's physical environments are pleasant, which is in tune with the University's concern to provide an infrastructure that favors their learning.

Finally, from the survey's results some items are found whose score is close to 3 points and constitute an opportunity for improvement. Among them, there is student motivation to participate in classes, the opportunity they perceive to develop interpersonal skills, that teaching is well

focused, clarity of the objectives of learning, and the possibility of receiving feedback. All these elements are related to teaching centered on the student, a task to which we are committed. Among the limitations of our study, we should mention the lack of stratified analysis according to the student's gender and by year in the career, as done by Bakhshi *et al*.[4] and Said *et al*.[8] who found statistically significant differences in the perception of the educational environment between men and women and according to the year in the career in which they were enrolled. In 2014, the research has continued and efforts are underway to broaden the measurement field to the five years of the career to obtain an individualized perception profile of the educational environment.

The implications of this study include a collective effort by the School of Nursing to maintain a favorable educational environment for student learning, along with this, to design an intervention and support system to improve the weaknesses they perceive of the educational environment.

Conclusion

Perception of the EE is a variable that influences on the students' stress and motivation and, thereby, on their academic results. The changes introduced permitted adjusting the curriculum, dimensioning – in approximate manner – student workload, and introducing general formation courses. Although as a whole both cohorts evaluated the EE with *"more positive aspects than negative"*, it was concluded that any curricular change should be linked to an objective and realistic measurement of the academic load and in correspondence with student-centered learning methodologies. Herein, we demonstrated the need to revise aspects like reinforcement of support strategies for students who perceive stress during the career, and persevere on techniques where students are the center of the teaching-learning process.

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