

## Research Article

## How Teaching and Internship Influence the Evidence-Based Practice Approach of Nursing Students: A Longitudinal Study

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### Abstract

**AIM:** The study aimed to analyze students' approach to evidence-based practice and evaluate the effect of teaching (based on lessons in statistics, epidemiology, evidence-based nursing, bioengineering, English language) and internship experiences on the attitude of nursing students to evidence-based practice.

**METHOD:** In 2019, one hundred nineteen second-year nursing students from an Italian university were involved in a pre-post longitudinal study. The Italian version of the Student-Evidence Based Practice Questionnaire was administered to nursing student in four moments of one academic year.

**RESULTS:** The Student-Evidence Based Practice Questionnaire showed different mean scores based on the four moments of the survey with a significant increase after the experience of planning clinical cases with an online simulation system. In particular, the aptitude subscale does not have significant improvements in the various phases of the study. Conversely, the support of the clinical tutor affects student performance. The didactic module on evidence-based nursing develops the ability to assess the quality of the information found and its sharing. Basic English proficiency is not significantly correlated.

**CONCLUSION:** To develop evidence-based practice knowledge, aptitude, and skills in nursing students, it is necessary to strengthen the learning opportunities both in classroom lessons and in simulation and internship experiences.

**Keywords:** Evidence-based practice, Italy, nursing student, nursing education

### Introduction

The nursing use of evidence-based practice (EBP) can be the method to give attention to patients and take care of them at best. Jordan et al. (2019, p. 62) defined Evidence-Based Healthcare as "clinical decision-making that considers the feasibility, appropriateness, meaningfulness and effectiveness of healthcare practice," which are informed by the best available evidence, the context, the patient preferences and the clinician expertise. Lack of knowledge, skills, and resources appear to be the main barriers to EBP implementation (Zhao et al., 2022). Certainly, EBP implementation in daily clinical practice begins from undergraduate education (Abu-Baker et al., 2021), which must make students competent in using evidence in their clinical practice (Baixinho et al., 2022). The educational interventions currently used different methods and the best EBP teaching strategy has not yet been established (Ramis et al., 2019). Lehane et al. (2021) defined four competency domains in the development of clinical effectiveness education: EBP, quality improvement processes, implementation strategies, and collaborative practice. The need to develop EBP skills in

nursing was well highlighted by a recent study conducted in Europe which identified 120 learning objectives classified into 3 domains: affective, cognitive, and skills (Dolezel et al., 2021).

Universities around the world are increasingly aiming to train future nurses capable of implementing EBP in their daily clinical practice. In Italy, the training course in nursing is divided into 3 years of course including 6 semesters, provides for a total of 180 European Credit Transfer System (ECTS) credits, of which 60 to be acquired in training activities aimed at developing specific professional skills (internship) (University of Perugia, 2023a). The bachelor's course in nursing at the Perugia University in Italy used traditional lectures and clinical training activities for the development of EBP skills. Among the objectives of the internship, those of the second academic year include the following: search the literature for evidence of effectiveness starting from the questions that emerged in clinical practice; critically analyze the literature; use the best evidence in practice, declining it on the basis of values, beliefs, user preferences, available resources, and clinical judgment (University of Perugia, 2023b). On March 5, 2020, all Italian schools and universities were closed because of the coronavirus

disease 2019 (COVID-19) pandemic. Lessons face-to-face and internships were stopped and in a short time lessons switched to online mode, including EBP lessons. This was a challenge for the educator. As well as in other countries in the world (Dewart et al., 2020) the online mode was the best solution for avoiding an interruption in students' careers. The bachelor's degree course in Nursing at Perugia University implemented simulated online activity to replace a part of the clinical internship hours; the online activity focused on critical thinking development and nursing process planning. This new situation was unfamiliar to faculty members and had barriers related to instructor abilities, students' learning needs, and technological availability (Gaffney et al., 2021) and opportunities related to new methods for dissemination of knowledge, innovation, and EBP in nurse education (Carolan et al., 2020; Wallace et al., 2021), also for students' EBP approach. Universities need some resources to develop this opportunity (Singh & Haynes, 2020) and reduce barriers and it was essential for not to stop the university career of students. It was necessary to look at new possibilities that the teaching/learning era offers (Rizzo Parse, 2020). Today, after returning to face-to-face activities, many Italian universities, such as the University of Perugia, have decided to continue using the online mode for part of the curricular activities.

The validation study of the Italian version of the Student-Evidence Based Practice Questionnaire (S-EBPQ) began in 2020 (Longo et al., 2021). The questionnaire aims to evaluate the EBP approach of nursing students and the efficacy of education. This study began before the COVID-19 pandemic and continued during it, covering 1 year, switching from face-to-face administration of the questionnaire to online mode. The Italian version of S-EBPQ was used to evaluate the efficacy of the new strategy used in EBP education.

The purpose of this study was to evaluate the student's approach to EBP and identify the factors that can influence it. In particular, we analyzed the correlation between the students' approach to EBP and the attendance of an academic year and the correlation between the score of the S-EBPQ questionnaire and the exam marks on the teaching subjects that are part of the didactic module on EBP and on internships.

### Research Question

1. The questionnaire was administered to all 150 nursing students of the Perugia University attending the second year of the 2019–2020 academic year.

## Method

### Study Design

A pre-post longitudinal study was carried out.

### Variables

The variables analyzed in the study are the students' knowledge, aptitude, and skills concerning EBP. The evaluation of the influence of university education was carried out through the use of some independent variables: the experience lived in the first year of the degree course in Nursing and the grades of the university exams in Statistics, Epidemiology, Scientific Evidence for Nursing, Bioengineering/Informatics, English Language and internships.

### Data Collection Tools

We used the Italian version of the Student-Evidence Based Questionnaire (S-EBPQ) developed by Upton et al. (2016). In the Italian validation study showed that the Content Validity Index (CVI) for the whole questionnaire was 0.9, each item of the Italian version of S-EBPQ was considered *clear* by over 80% of the experiential panel, and the overall Cronbach's Alpha of the questionnaire was 0.94 (Longo et al., 2021).

The S-EBPQ consists of 21 items divided into four subscales: Retrieving and Reviewing Evidence (7 items), Frequency of Practice (6 items), Sharing and Applying EBP (5 items), and Attitude (3 items). The answers to the questionnaire are collected using a Likert scale with values from 1 to 7. This allows for evaluating the differences in the results by comparing the averages of the subscales or by comparing the results of the individual items.

### Data Collection

The questionnaire was administered to all 150 nursing students of the Perugia University attending the second year of the 2019–2020 academic year. The questionnaire was administered in four specific moments of this academic year. At the beginning and the end of the Evidence-Based Nursing (EBN) didactic module, respectively, on November 4, 2019 and January 15, 2020. These first two administrations took place on Face to Face modality. Then, at the end of the online activity of the second academic year, from October 3 to 10, 2020, and at the end of the in-presence internship of the second academic year, from October 25 to 30, 2020. In the third administration, the students were asked to answer the questionnaire taking into account only their online activity experience in order to evaluate its effectiveness, distinguishing the fourth administration in which they were asked to answer taking into consideration only the experience internship "in presence." During the study, the COVID-19 pandemic emerged. For this reason, the first two administrations of the S-EBPQ took place face-to-face and the other two were conducted online.

### Interventions

The subjects covered were included in the didactic module entitled "Evidence-Based Nursing" consisting of 150 hours of which 75 hours of theoretical lessons and 75 hours of self-study, equal to 5 ECTS credits (1 ECTS credit = 30 hours). Theoretical lessons were held during the first semester of the second academic year; they started at the beginning of November 2019 and ended by the end of January 2020. An average of 20 hours of lessons in this module were held each week of this semester. This didactic module included the subjects of Statistics, Scientific evidence for Nursing, Bioengineering/Informatics, and Epidemiology. The contents of the modules were as follows:

- Statistics (1 ECTS credit): the model of the scientific study, descriptive statistics, inferential statistics, linear regression for the analysis of the relationship between variables
- Scientific evidence for Nursing (1 ECTS credit): the sources of evidence, biomedical banks, research strategies; reading, analyzing, and evaluating the methodological quality of a clinical study
- Bioengineering (1 ECTS credit): biomedical technologies, medical informatics

- Epidemiology (2 ECTS credits): the role of epidemiology in the health surveillance, preventive, and health promotion interventions and the types of epidemiological studies.

In addition to the aforementioned curricular activities, the students attended seminars that included topics such as critical thinking and Gordon's functional models and had a meeting with the Library Services Center of the University of Perugia.

At the end of the theoretical lessons of the second semester, in the months of July and September 2020, the students participated in a practical internship (300 hours, 10 ECTS credits) called "remote learning," carried out on the online Advanced Simulation System called Florence® developed by Zanichelli/CEA which allowed the development of 6 clinical cases. This Advanced Simulation System permits a nursing planification using evaluation forms and scales based on the theory of Gordon's functional health patterns, and the management of the nursing records based on NANDA-I, NOC, and NIC taxonomies. A preliminary lesson was held with a teacher to give the students a chance to familiarize themselves with this Simulation System; the students had 2 months to develop the 6 clinical cases—evaluated by a committee comprising faculty members.

Finally, the students carried out clinical internships in various wards of the University hospital of Perugia (Italy) (330 hours, 11 ECTS credits). The internship has a duration of 150 hours per month and lasts over 8 weeks, in the months of September and October 2020. In this phase, the internship was represented exclusively by clinical activity in different care settings.

In addition to the Italian version of S-EBPQ, five preliminary questions have been added and six concluding questions. The opening questions considered the first academic year and internship experience, whereas the concluding questions considered the exam grades in English 1, English 2, Statistics, Epidemiology, EBN, and Bioengineering.

### Statistical Analysis

The values obtained from the administration of the S-EBPQ questionnaire at the four different times were analyzed to statistically define whether the changes detected in the scores are significant. It was calculated percentage, mean and standard deviation to evaluate the data obtained from the survey. To compare the results obtained in different surveys overtime on the same group it was used the repeated measures analysis of variance (ANOVA) test. A pairwise correlation approach was used to explore the correlation between the questions in the questionnaire, the subjects taught, and the grades. For all estimates, a  $p < 0.05$  was considered statistically significant. The data were analyzed using Stata® Statistical Software: Release 14.2 (StataCorp LP, College Station, TX, USA).

### Ethical Considerations

The study was performed in accordance with the Declaration of Helsinki and was approved by the director of the nursing bachelor's degree course (School of Nursing) of University of Perugia,

on September 26, 2019. The students were guaranteed anonymity. The return of the completed questionnaire was considered as an expression of informed consent.

## Results

### Respondent Characteristics

The sample study consists of 119 students attending the second year of the nursing degree program in the academic year 2019–2020 at the University of Perugia, Italy. Of these, 29 are male, and 90 are female; the mean age was 22.6 years. The sample consisted of students who responded fully to all four administrations. These represent 79.3% of the total number of students involved. The size of the sample is in line with other studies on the subject (Longo & Ramacciati, 2021), who used a sample consisting on average of 70% of the students involved. The first administration took place on October 28, 2019. One hundred thirty-nine questionnaires of the 150 distributed were collected—except 2 of them, because of being incomplete. The second administration took place from January 14 to 17, 2020. One hundred twenty-eight students completed the questionnaire, corresponding to 85.3% of the total. The third phase took place from October 3 to 10, 2020. One hundred twenty-two students answered (81.3% of the total). The last administration took place from October 25 to 30, 2020. One hundred nineteen students out of 150 completed the questionnaire (79.3%). Compared to the first administration of S-EBPQ, 18 participants were lost. These constitute the study's final sample—which considers only the students who participated in all four questionnaire administrations.

### Previous Experience in the Degree Program

For the preliminary questions, 58.4% of the participants declared that they were "very much" motivated by their experience in the first academic year; only 8% of the students judged the openness of the clinical context to implementation of scientific research in clinical practice as "very much" and the 15.3% of students assign the rating "not at all."

### Scores in the Student-Evidence Based Questionnaire

In the first administration, the total score of the EBPQ-S questionnaire showed an average, over a range from 1 to 7, of 4.89 (SD 0.73): in particular, 4.54 (SD 0.66) in the "Frequency of use" subscale, 5.82 (SD 0.51) in the "Attitude" subscale, 4.13 (SD 0.35) in the subscale "Retrieving/Reviewing," and 5.08 (SD 0.21) in the "Sharing/Applying" subscale. In the second phase, compared to the first administration of the questionnaire, in the subgroup "Frequency of use," there was a slight decrease in the average score. In the "Attitude" subgroup, the scores of the various items remained almost unchanged, whereas in the "Retrieving/Reviewing" subgroup, there was an increase in the score of all items ( $p < .001$ )—except for the item regarding the ability to transform information needs into research questions ( $p < .001$ ). Finally, in the "Sharing/Applying" subgroup, the average scores of all items are increased ( $p = .002$ ), excluding the item concerning the application of the information obtained from the research in specific cases. In the third administration, compared to the first administration of the questionnaire, the average score increased significantly—in particular, between the second and third administrations. Between the first and third

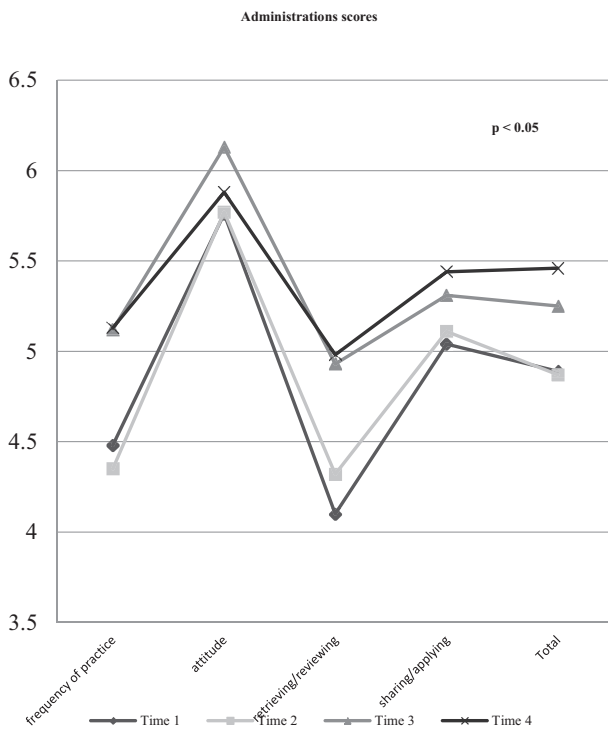
**Table 1.**  
Questionnaire Scores by Time Administration

Administration	S-EBPQ Subcategories				S-EBPQ Total	ANOVA test
	Frequency of Use	Attitude	Retrieving/Reviewing	Sharing/Applying		
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)		
Time <sub>1</sub>	5.54 (0.66)	5.82 (0.51)	4.13 (0.35)	5.08 (0.21)	<b>4.89 (0.73)</b>	<b>p &lt; .001</b>
Time <sub>2</sub>	4.33 (0.47)	5.75 (0.52)	4.26 (0.13)	5.12 (0.21)	<b>4.87 (0.70)</b>	<b>p = .236</b>
Time <sub>3</sub>	4.86 (0.37)	5.92 (0.43)	4.92 (0.09)	5.29 (0.12)	<b>5.25 (0.49)</b>	<b>p &lt; .001</b>
Time <sub>4</sub>	5.13 (0.24)	5.88 (0.28)	4.98 (0.12)	5.44 (0.11)	<b>5.46 (0.40)</b>	<b>p = .002</b>

Note: ANOVA = Analysis of variance; S-EBPQ = Student Evidence-Based Practice Questionnaire; Time<sub>1</sub> = Baseline S-BPQ administration; Time<sub>2</sub> = End of the theoretical lessons; Time<sub>3</sub> = After the "remote" mode internship; Time<sub>4</sub> = After the "on the field" mode internship.

administration, item 1 (Formulated a clear research question at the beginning of the process to fill this gap) and item 19 (Sharing ideas and information with your colleagues) slightly declined (respectively  $p = .008$  and  $p = .852$ ), whereas between the second and third administrations, only item 5 (Evaluated the results of your work practice,  $p < .001$ ) and item 19 (Sharing ideas and information with your colleagues) did. In the fourth administration, compared to the other three questionnaire administrations, there was a further increase in the average score.

Questionnaire scores are shown in Table 1 and Figure 1. The repeated measures ANOVA test for each item highlighted a statistical significance of the increase in average scores, especially after the third administration. Results of repeated measures ANOVA test are reported in Table 2.



**Figure 1.**  
Scores in the Stages of Administration.

**Correlation With Exam Grades**

The correlation test revealed some statistically significant correlations (see Tables 3–6). Regarding the preliminary questions

**Table 2.**  
ANOVA Repeated Measures for Single Item

Item	F <sub>(3,354)</sub>	p
1. Formulated a clearly answerable question	4.01	.008
2. Tracked down the relevant evidence	18.42	<.001
3. Critically appraised. against set criteria	26.24	<.001
4. Integrated the evidence	17.59	<.001
5. Evaluated the outcomes of your practice	9.68	<.001
6. Shared this information with colleagues	4.39	.005
Subscale: Frequency of Practice	21.41	<.001
7. I resent having my clinical practice questioned	0.33	.802
8. Evidence-based practice is a waste of time	0.92	.432
9. I stick to tried and trusted methods	3.55	.014
Subscale: Attitude	1.42	.236
10. Research skills	27.72	<.001
11. Converting your information needs	13.42	<.001
12. Awareness of major information types	25.61	<.001
13. Knowledge of how to retrieve evidence	30.71	<.001
14. Ability to analyze critically	38.19	<.001
15. Ability to determine how valid	26.02	<.001
16. Ability to determine how useful	17.57	<.001
Subscale: Retrieving and Reviewing Evidence	42.52	<.001
17. Ability to identify gaps	4.30	.005
18. Ability to apply information	6.72	<.001
19. Sharing of ideas and information with colleagues	0.26	.852
20. Dissemination of new ideas	3.59	.014
21. Ability to review your own practice	3.92	.009
Subscale: Sharing and Applying EBP	5.02	.002

Note: ANOVA = Analysis of variance; EBP = Evidence-based practice.

**Table 3.**  
Correlation Between the Preliminary Questions and the Teaching Subjects ( $p < .05$ )

	Pre_1	Pre_2	Pre_3	Pre_4	Pre_5
English_1	-0.0299	-0.0335	-0.0811	-0.1649	0.0123
English_2	0.0816	-0.0778	0.0648	-0.0457	0.0777
Statistics	-0.0239	-0.0022	-0.0150	0.0392	-0.0864
Stat_vote	-0.0429	-0.1104	-0.0021	0.0512	0.0240
Epidemiology	0.0428	-0.0971	0.0135	0.0109	0.0002
Epi_vote	-0.0353	-0.1158	-0.1021	-0.0149	0.1021
EBN	-0.0227	0.0061	0.0065	0.0166	-0.0593
EBN_vote	0.0112	-0.0596	-0.0799	-0.0461	0.1699
Bioengineering	-0.0086	0.0459	-0.1207	-0.0376	0.0081
Bioeng_vote	0.1259	0.0833	-0.0824	-0.1020	<b>0.2585</b>
Internship	-0.0305	<b>0.2076</b>	-0.0078	-0.1029	-0.1135
Inter_vote	0.1394	0.1225	<b>0.2364</b>	0.1499	-0.0400

Note: Statistical significance is highlighted by the bold font. Pre, Preliminary questions.

Response range: from 1 (not at all) to 7 (very much).

Pre\_2= Compared to the experience of previous internships, how much did you feel supported by the tutor?; Pre\_3= Compared to the student experience in the Nursing degree course, how gratified do you feel?; Pre\_5= Based on your experience to date, how recognized do you consider nursing practice within clinical contexts?.

(abbreviated "Pre"), a positive correlation was found between the item Pre\_2 (which concerns the perception of being supported by the tutor during the internship) and having taken the internship exam ( $p < .05$ ); the item Pre\_3 (which concerns the degree of gratification concerning the degree course) and the grade obtained in the internship exam ( $p < .05$ ); the item Pre\_5 (which concerns the perception of the value of nursing in clinical contexts) and the grade in the Bioengineering exam ( $p < .05$ ). In the EBP Frequency of Use subscale (abbreviated

"Use"), a negative correlation was highlighted between the EBN exam grade and the Use\_F item score (... how often did you share information with colleagues?) ( $p < .05$ ). In the "Retrieving/ Reviewing" (abbreviated "Rev") subgroup, the item Rev\_C (awareness of the main types and sources of evidence) and the grades in Bioengineering ( $p < .05$ ), between the item Rev\_F (ability to determine the validity of the material) and the grades in English\_1, highlighted negative correlations ( $p < .05$ ). While a positive one between the item Rev\_F and the grades of the

**Table 4.**  
Correlation Between the Questions of "Frequency of Use" and "Attitude" Subscales and the Teaching Subjects ( $p < .05$ )

	Use_A	Use_B	Use_C	Use_D	Use_E	Use_F	Use_sub	Att_A	Att_B	Att_C	Att_sub
English_1	-0.088	-0.122	-0.153	-0.106	-0.041	0.023	-0.106	0.068	-0.041	-0.014	-0.000
English_2	-0.172	-0.032	-0.127	-0.022	-0.142	0.003	-0.107	-0.036	-0.089	-0.038	-0.068
Statistics	0.052	-0.011	-0.076	-0.010	0.004	0.118	0.015	0.150	-0.086	-0.039	0.000
Stat_vote	0.053	-0.022	0.050	0.078	0.040	-0.036	0.037	0.135	-0.009	0.025	0.058
Epidemiology	0.015	-0.074	-0.051	-0.044	0.079	0.113	0.009	0.064	-0.032	-0.008	0.005
Epi_vote	0.011	0.038	0.114	0.010	0.040	-0.024	0.044	0.056	0.067	0.097	0.096
EBN	0.039	-0.059	-0.084	-0.011	-0.012	0.083	-0.010	0.140	-0.068	-0.013	0.016
EBN_vote	0.189	-0.034	-0.067	-0.098	-0.104	<b>-0.272</b>	-0.098	-0.016	-0.056	-0.030	-0.041
Bioengineering	0.063	-0.050	-0.112	-0.120	-0.015	-0.100	-0.080	-0.001	-0.043	0.003	-0.016
Bioeng_vote	0.086	0.002	0.133	-0.023	0.039	0.036	0.064	0.032	-0.010	-0.028	-0.005
Internship	-0.048	-0.101	-0.040	-0.124	-0.104	-0.158	-0.127	-0.095	-0.048	-0.084	-0.095
Inter_vote	0.056	0.083	0.115	0.136	0.033	0.090	0.115	0.061	0.048	0.129	0.106

Note: Statistical significance is highlighted by the bold font.

Response range: 1 (never) to 7 (frequently).

Use\_F= Over the past 6 months, in response to a gap in your knowledge of patient care, how often have you shared information (regarding evidence of efficacy) with colleagues?. Use, Frequency of use subscale; Att, Attitude subscale.

**Table 5.** Correlation Between the Questions of "Retrieving/Reviewing" and "Sharing/Applying" Subscales and the Teaching Subjects ( $p < .05$ )

	Rev_A	Rev_B	Rev_C	Rev_D	Rev_E	Rev_F	Rev_G	Rev_sub	Sha_A	Sha_B	Sha_C	Sha_D	Sha_E	Sha_sub
English_1	0.108	-0.077	-0.020	-0.008	-0.064	<b>-0.198</b>	-0.085	-0.060	-0.031	0.004	0.046	0.017	0.024	0.017
English_2	0.055	-0.048	-0.046	0.020	-0.013	-0.021	-0.116	-0.028	-0.107	-0.068	0.023	0.079	-0.090	-0.031
Statistics	-0.056	-0.022	-0.078	-0.066	-0.054	-0.002	-0.092	-0.064	0.064	0.003	0.139	0.089	0.108	0.105
Stat_vote	0.068	0.119	0.199	0.039	0.153	0.065	0.152	0.140	0.164	0.185	0.090	-0.033	0.094	0.115
Epidemiology	-0.025	0.042	0.050	-0.033	0.008	0.034	0.004	0.013	-0.017	0.050	0.106	0.049	-0.021	0.046
Epi_vote	0.141	0.174	0.147	0.144	0.129	0.007	0.181	0.157	0.063	0.104	0.025	0.026	0.059	0.068
EBN	-0.099	-0.039	-0.078	-0.100	-0.084	-0.034	-0.131	-0.097	0.060	-0.023	0.074	0.010	0.067	0.047
EBN_vote	-0.154	-0.100	0.033	-0.185	-0.129	-0.041	-0.035	-0.107	0.076	-0.080	-0.208	<b>-0.278</b>	-0.088	-0.163
Bioengineering	-0.171	-0.105	<b>-0.184</b>	-0.075	-0.082	-0.086	-0.059	-0.128	0.055	0.044	-0.021	0.055	0.050	0.045
Bioeng_vote	0.097	-0.007	0.127	-0.112	-0.067	0.054	-0.023	0.006	0.118	0.154	0.104	0.187	0.135	0.178
Internship	-0.021	-0.138	-0.029	0.003	-0.016	0.013	-0.114	-0.049	-0.078	-0.040	-0.109	-0.131	-0.017	-0.099
Inter_vote	0.019	0.026	0.126	0.151	0.090	<b>0.253</b>	0.088	0.131	-0.021	0.005	0.099	0.045	-0.003	0.035

Note: Statistical significance is highlighted by the bold font.

Response range: 1 (poor) to 7 (excellent).

Rev\_C=On a scale of 1 to 7, how would you rate your awareness of the main types of information and sources?; Rev\_F=On a scale of 1 to 7, how would you rate your ability to determine how valid (close to the truth) the material is?; Sha\_D=On a scale of 1 to 7, how would you rate your spread of new ideas on assistance with colleagues?.

**Table 6.** Correlation Between the Teaching Subjects ( $p < .05$ )

	Engl_1	Engl_2	Stat	Stat_vote	Epidem	Epi_vote	EBN	EBN_vote	Bioeng	Bioe_vote	Internship	Inter_vote
English_1	1.00											
English_2	<b>0.331</b>	1.00										
Statistics	0.073	0.113	1.00									
Stat_vote	0.027	-0.298		1.00								
Epidemiology	-0.035	-0.085	<b>0.563</b>	0.140	1.00							
Epi_vote	-0.086	-0.155	-0.056	0.141		1.00						
EBN	0.065	0.092	<b>0.925</b>	<b>0.236</b>	<b>0.526</b>	-0.135	1.00					
EBN_vote	<b>-0.315</b>	-0.168	-0.130	<b>0.229</b>	-0.085	<b>0.227</b>	1.00					
Bioengineering	0.127	0.097	<b>0.387</b>	-0.189	0.114	-0.055	-0.210	1.00				
Bioeng_vote	0.009	-0.079	0.078	0.008	0.154	0.176	0.044	0.201	1.00			
Internship	-0.044	-0.040	-0.009	0.055	-0.004	-0.125	0.015	0.132	-0.051	0.043	1.00	
Inter_vote	-0.152	-0.021	0.012	0.102	-0.050	0.008	-0.020	0.033	-0.055	-0.059	0.052	1.00

Note: Statistical significance is highlighted by the bold font.

internship exam ( $p < .05$ ). In the “Sharing/Applying” subscale (abbreviated “Sha”), a negative correlation was found between the EBN exam grades and the item Sha\_D (evaluation of your dissemination of new ideas on nursing with colleagues) ( $p < .05$ ).

### Discussion

The participants all attended the second year regularly—there were no off-course students. The sample was made up of 119 students, representing 79.3% of the students involved. The questionnaire was administered in four moments—to identify the changes that could occur following the attendance of theoretical lessons and practical training. The students were given the S-EBPQ questionnaire in the Italian version. In the first administration, five preliminary questions were added, regarding the students’ experience during the first year of the degree course. As discussed in the validation study of the Italian version of the S-EBPQ (Longo et al., 2021), the repeated measures ANOVA test showed a significant increase between the four administrations, except for the “Attitude” subscale (abbreviated “Att”). As reported by Ramsay et al. “Attitude is a complex concept, and shifting attitudes in the desired direction may require more than traditional educational interventions” (2020, page 4). In particular, there was a sharp increase in the average score of the tool after the third administration, which corresponds to the online activity. Simulation as a teaching method has been the subject of study in recent years and has become essential with the spread of the COVID-19 pandemic. Sullivan et al. (2019) observed that simulation offers an intense and effective learning environment, thanks to greater autonomy in activities and more time devoted to critical thinking (2019). Although numerous international studies have highlighted the influence of students’ basic knowledge on the EBP approach (Askorab et al., 2015; Labrague et al., 2019; Leach et al., 2015; Palese et al., 2018; Ramacciati, 2013; Zhang et al., 2019), our study did not reveal always linear correlations of S-EBPQ scores with the grades obtained by students in the university exams of Statistics, Epidemiology, Scientific Evidence for Nursing, Bioengineering/Informatics, English Language and internships. We have hypothesized several possible reasons for this. Regarding the preliminary questions, there was a positive correlation between the perception of the clinical tutor support—during the internship—and the student’s satisfaction concerning the degree course—with having taken the internship exam and the relative grade. Students who scored higher in gratification and support than the clinical tutor and degree course scored higher on the internship exam. Organizational support, workplace satisfaction, and mentorship were defined as facilitators in the implementation of EBP (McSherry et al., 2006; Yoo et al., 2019). Another aspect taken into consideration was the correlation between student satisfaction and their performance as discussed by Milton-Willey et al. (2014). They pointed out that student satisfaction also depends a lot on the not very accommodating attitudes of some clinical tutors, who are not very available or prepared to support the student. The negative relationship between the awareness and understanding of the importance of disseminating new scientific knowledge (Use\_F and Sha\_D) with the EBN grade can be attributed to an overestimation of students in the first

phase of the study (before theoretical lessons). As also argued by Piper et al. (2019), students tend to overestimate their self-assessment. The score on these items may have decreased in the later stages of the study after the students’ knowledge increased, which led to a more informed self-assessment. Student overestimation also emerged in McSherry et al. study (2006), in which understanding aspects of EBP was not seen as a barrier, but in reality, students did not have adequate research knowledge. This could be the case of our study, where a significant negative correlation was found between the grade of the Bioengineering/Informatics exam and the item on knowledge of the main sources of EBP (Rev\_C). The increased knowledge in Informatic technologies (IT) may have made their shortcomings evident in the students. Nonetheless, the improved ability to determine the validity of a study (Rev\_F) after the lessons in EBP, was positively correlated with the grade of the internship exam. This aspect highlights a correlation between understanding scientific studies and the ability to provide adequate care. The improvement obtained in this phase of the study could be the result of the distance training activity carried out on the online advanced simulation system “Florence.” Indeed, the online multimedia-based simulation can be a valid tool to apply theoretical knowledge and improve critical reflection (Piper et al., 2019; Verkuyl & Hughes, 2019). The virtual internship not only allows you to use and experiment with previous knowledge but also favors the implementation of new ideas in clinical practice (Dubovi, 2019), but students have difficulty in interacting with other students during the online simulation (Verkuyl & Hughes, 2019; Smith et al., 2021), and this could partly explain the negative correlation between the EBN exam grade and the students’ self-assessment of the dissemination of ideas on care (Sha\_D). It is important that the online lessons are well structured and organized in such a way as to foster relationships between students and between them and the teacher (Richter & Schuessler, 2019). As highlighted in other studies (Patelarou et al., 2021), knowledge of the English language is a factor that positively influences the implementation of EBP. In our study, the basic linguistic understanding was not correlated with understanding the validity of the article. As reported by other authors, true understanding requires knowledge of the meaning of terms related to EBP (Al-Ansari & El Tantawi, 2014) and the ability to judge the quality of the items found (Dagne et al., 2021).

### Study Limitations

The main limitation of this study was represented by the unexpected transition from traditional to online teaching. It was a forced choice due to the emergence of the COVID-19 pandemic. The online teaching method—introduced in an emergency—did not have adequate planning and organization. The training of the students in this phase took place mainly individually. Another limitation was the monocentric enrollment and the geographical location that reduced the generalizability of the results.

### Conclusion and Recommendations

This study found that nursing students have a good aptitude for approaching EBP but believe that clinical settings are still

not very open to implementing the new evidence. It is important that health-care organizations and universities create an environment that adequately supports students and that promotes the culture of Evidence-Based Health. Training in EBN and critical thinking skills is very important for the acquisition of competence and awareness in research, and understanding of scientific articles. Group study should be promoted by universities to allow for comparison between students and the development of the ability to share information. We hope that this study will fit into the line of research on EBP implementation strategies not only for scholars and nursing students but also for clinical nursing.

**Ethics Committee Approval:** This study constitutes an integral component of the nursing thesis carried out by the first author, supervised by the last author at the School of Nursing, University of Perugia. The thesis was submitted for approval on September 26, 2019.

**Informed Consent:** Verbal informed consent was obtained from the students who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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