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RECEIVED 31 January 2023

ACCEPTED 15 June 2023

PUBLISHED 04 July 2023

CITATION

Nguyen THH, Bui HT, Phan HA, Hoang HT and Hoang VL (2023) Mediating role of educational environment in the relationship between workload and generic skills of nursing students in Vietnam.
Front. Educ. 8:1155020.
doi: 10.3389/feduc.2023.1155020

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Mediating role of educational environment in the relationship between workload and generic skills of nursing students in Vietnam

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Students' learning experiences are considered useful indicators to evaluate the effectiveness of teaching in tertiary education. With limited theory-driven research, this study aimed to examine whether the educational environment is able to mediate the relationship between student workload and generic skills. A cross-sectional study was conducted among 1347 nursing students in ten nursing schools across Vietnam from November 2021 to January 2022. The results showed that the total score of the students' workload and the generic skills were 3.25 ± 0.59 and 3.84 ± 0.56 (possible score: 1-5), respectively. Students were at an "agree" level with statements like "the sheer volume of work to be got through in this course means you can't comprehend it" and "as results of doing this course, I feel more confident about tackling unfamiliar problem". Most nursing students rated the educational environment at levels of "more positive educational environment" ($N=1018$, 75.58%), with a total score of 120.75 ± 20.78 (possible score: 0-200). The educational environment was identified as a mediator in the relationships between the workload and the generic skills. The direct effect on workload was -0.00035 which was not significant ($p=0.987$) with the generic skills. The indirect effect of workload that passes through the educational environment was -0.07 and is also statistically significant, at $p=0.002$. As such, the study suggests that, to enhance students' generic skills, it is necessary to instruct students in efficient learning strategies to help them manage their academic workload, particularly during unexpected situations such as the COVID-19 pandemic. Additionally, despite the occurrence of a high level of student workload, nursing schools could focus on efficient tactics and interventions to improve the educational environment, which subsequently helps to improve students' outcomes.

KEYWORDS

workload, generic skills, educational environment, mediating role, nursing

1. Introduction

The learning experiences acquired by students can be considered one of the most well-rounded performance indicators that have been extensively utilized to evaluate the effectiveness of teaching in tertiary education (Elken and Tellmann, 2019). In health education, the

educational environment, which is defined as all occurrences within the classroom, faculty, or university, is highly determine the success of students (Genn, 2001; Roff and McAleer, 2001). Understanding the positive impacts of a well-perceived educational environment, therefore, would support students in achieving their best academic outcome and assist educators in implementing an effective curriculum that best supports students. Research suggests that a well-perceived educational environment is strongly associated with a range of positive outcomes including higher student satisfaction and motivation, along with greater success in both academic and professional practice (Lizzio et al., 2002; Bakhshialiabad et al., 2015).

Student workload has been known as one of the factors, which could influence students' academic outcomes (Cho et al., 2021). There are a variety of factors that can contribute to how a student perceives their learning conditions which include the volume of work to be completed, the pressure to do well, or the time is given to fully comprehend the materials. Heavy workload is frequently associated with surface learning habits from students whereas a deep learning strategy would be more likely to be adopted by students when immersed in an active and motivational environment (Kyndt et al., 2011).

Generic skills are comprised of a set of soft skills, which consists of teamwork, adaptation, communication, planning, and problem-solving which are all important outcomes that need to be acquired through the education process. Since generic skills are acquired in the context of specific qualifications, they are typically as a measure of learning outcomes and students' compatible with their educational environments, and with its three interrelated aspects of knowledge, skills, and the level of application (Bowman, 2010). Literature indicated that constructivist educational environment, collaborative teaching methods, integrative pedagogy, as well as student engagement and preferred nursing major have all been linked to the acquisition of generic abilities (Virtanen and Tynjälä, 2018; Grande et al., 2022). However, traditional teaching like reading, lecturing, and individual working were negatively correlated to students' generic skills (Virtanen and Tynjälä, 2018).

Previous studies reported that effective teaching and appropriate workload could significantly enhance students' outcomes, their satisfaction, and the improvement of generic skills (Yin and Wang, 2015; Cheung et al., 2020). Although reducing the burden could help students develop their general skills, it is important to keep students' workload under control to improve their academic performance (Cheung et al., 2020). A perceived heavy workload may lead students to lack of motivation, fatigue, and stress as well as harm the educational environment (Ruohoniemi et al., 2010; Pelzer et al., 2014). Among nursing students, faculty role and teaching methods, academic expectations, and the accessibility of educational materials were identified as significant factors that impacted both academic achievement and their emotional well-being (Tharani et al., 2017; Hirsch et al., 2018). In Vietnam, according to Ramsbotham et al. (2019), the perception of the educational environment among undergraduate nursing students was rated as needing improvement by using the Dundee Ready Education Environment Measure. This was similar to those experienced in Western countries in that inter-professional relationships with teachers and ward clinical staff were key factors perceived influenced learning perception of nursing students (Ramsbotham et al., 2019).

In the context of Vietnam, the reform of higher education, a component of the national strategy for innovation known as "Doi

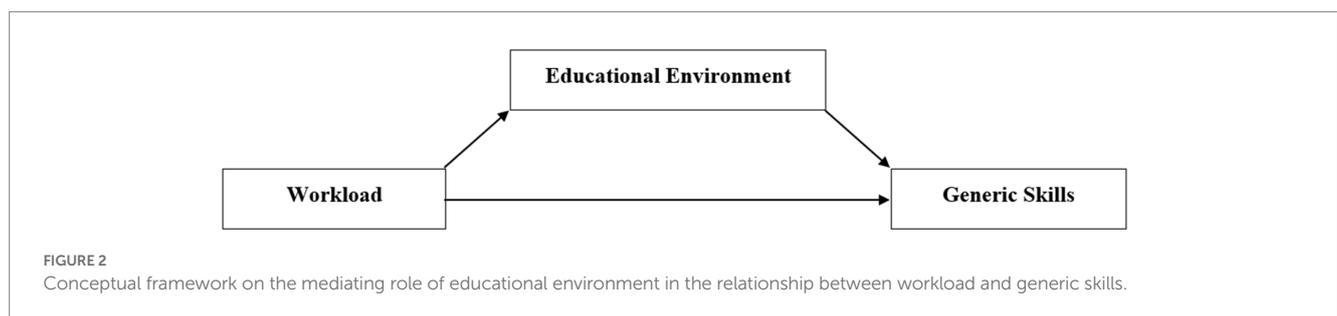
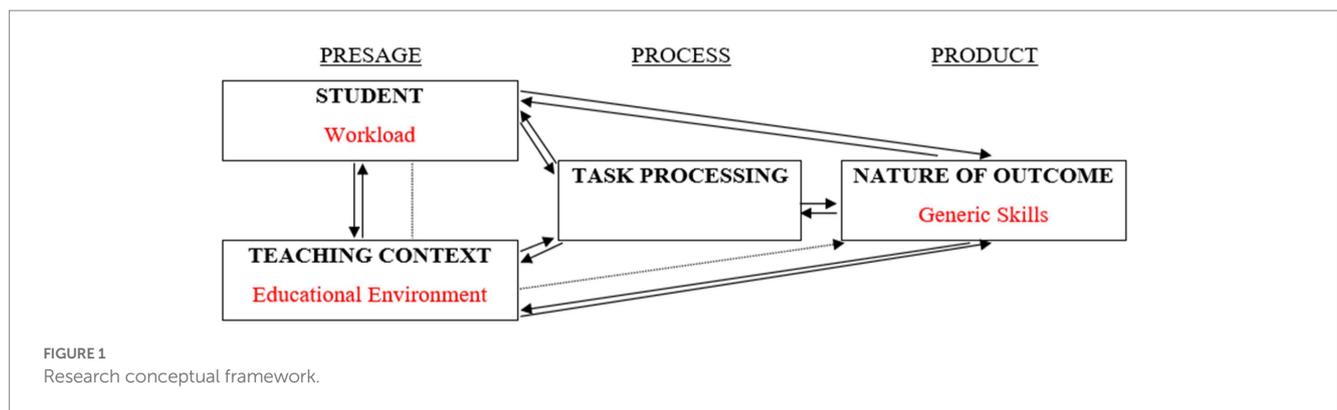
moi," is having a dynamic impact on nursing education (Nguyen et al., 2022). To be specific, this strategy depicted a need to strengthen nurse training capacity, increase the number of graduate nurses, and improve the quality of nursing course outcomes to meet professional standards that are comparable with neighboring regional countries (Nguyen et al., 2022). Consequently, there have been modifications in pedagogical approaches, with a shift away from mainly didactic teaching toward the inclusion of collaborative, active/experiential, and reflective teaching and learning strategies (Kang et al., 2018). Apart from its impact, there was, still a significant number of nurse instructors who were neither educated as nurses nor practiced nursing before teaching nursing students (Nguyen et al., 2018a,b). Additionally, nurse educators reported that their employers have provided them with comprehensive training programs in teaching methods; however, it is questionable whether these methods could be used effectively in their day-to-day practice (Tharani et al., 2017). Some strategies even hinder the nurse educators' confidence in clinical teaching such as informal mentorship (Nguyen et al., 2018b). Given the pace of educational change in the Vietnamese context, there is a need for assessing the student's learning outcomes and study workload as a part of the reform process. Additionally, whether those changes had any impacts on the students' learning outcomes or contribute to the development of student skills in Vietnam is still under-researched.

A concept framework for the research was created based on Bigg's 3P model of classroom learning through a synthesizing of the literature in the areas of workload, generic skills, and educational environment (Biggs, 1993). To be more precise, 3P model includes (Elken and Tellmann, 2019) Presage-student presage focused, (Roff and McAleer, 2001) Process-teaching focused, and (Genn, 2001) Product-nature of outcome. Each approach holds a particular belief on knowledge, teaching perception, and a distinctive focus on teaching evaluation. Implementing a learning-focused approach to teaching evaluation is crucial as it will provide feedback for all participants involved in teaching and learning (teacher, administrators, and students) about the necessary actions for achieving desired learning outcomes. In this study, the main directional flow is illustrated as our research conceptual framework in Figure 1. From there, the conceptual framework on the mediating role of Educational Environment in the relationship between Workload and Generic Skills is presented in Figure 2 to fit with our research. In fact, there is limited theory-driven research regarding the mediating role of the educational environment in the relationship between workload and generic skills. The workload, however, is considered a risk factor that can significantly predict less learning outcomes (Yin and Wang, 2015; Cheung et al., 2020), as well as a poor educational environment (Ruohoniemi et al., 2010; Pelzer et al., 2014). This study, therefore, aims to examine the hypothesis that the educational environment can mediate the relationship between the student workload and the generic skills perceived by the Vietnamese nursing students.

2. Materials and methods

2.1. Study design and setting

A cross-sectional multi-site study was carried out following the STROBE guidelines to increase methodological rigor. Ten nursing



schools throughout Vietnam were involved in this study to represent the diversity of areas, cultures, and school types (private vs. public). These schools included six in the North, one in the Central, and three in the South.

The data were collected from November 2021 to January 2022. In Vietnam, the academic year is split into two 5-month-long semesters. The first semester runs from September to January. To better understand the workload of the students after enrollment, we consequently made the decision to focus on the final 3 months of the first semester. Due to a greater number of extracurricular activities in September and October, it is possible that students were not entirely engaged in their studies during these first 2 months.

2.2. Participants and sampling

A snowball sampling method was used to conduct an online survey among undergraduate nursing students who were willing to participate and could access the survey link. Local university nurse educators assisted in posting the study’s information and the online survey to their nursing groups. Any nursing students who met the included criteria were linked to a questionnaire for response. After completing the survey, participants were asked to send the study information and survey link to any other nursing students who might be interested in the study. The data was collected until January 2022. During the period of data collection, 1,347 nursing students completed this questionnaire, and were included in this study.

As Structural Equation Model (SEM) path analysis was planned to identify the mediation effect, it is suggested that the minimum sample size of 405 is required for 0.8 power following the rule-of-thumb (Fritz and MacKinnon, 2007). The collected sample size of 1,347 therefore satisfies the power analysis of SEM technique.

2.3. Measurement of variables

2.3.1. The student workload and generic skills scales

The student workload and generic skills, which are predictor/ independent and outcome/dependent variables in this study respectively, were measured by two subscales in a 36-item version of the Course Experience Questionnaire (Biggs, 1993). This questionnaire is a useful instrument to evaluate the performance in teaching in higher education sectors (Wilson et al., 1997). This scale was largely recognized and applied in various settings (Law and Meyer, 2011; Liu et al., 2017). The students’ workload scale (five items) and the generic skills scale (six items) were defined as “the sheer volume of work to be got through in this course means I cannot comprehend it” and “as a results of doing this course, I feel more confident about tackling unfamiliar problem,” respectively (Law and Meyer, 2011). To assess these two aspects, the five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used. The average score of each subscale was calculated to assess the current workload and perceived generic skill among nursing students with the possible score is ranged from 1 to 5. The higher scores indicated a higher level of agreement regarding students’ perceptions of workload and the generic skills. The two scales were translated into Vietnamese using a back-translation process by independent bilingual experts to ensure correspondence in meaning and consistency in relation to the original version of the instrument (Chen and Boore, 2010). To be specific, translation to Vietnamese and back to English were made by two Vietnamese nurse instructors who all have very good skills in using English. After comparing and integrating different versions of this questionnaire, a revised translated version was reviewed to a back-translation process by another foreign nursing students as a native speaker. In the completion of this procedure, the minor incompatibilities in wording

were dealt with, no major differences were found. Lastly, the Vietnamese questionnaire was piloted to test the internal consistency. Our study showed the Cronbach's alpha scores of student workload and generic skills were 0.72 and 0.94, respectively.

2.3.2. The Dundee ready educational environment measure

To assess the level of educational environment as a mediating variable, the study used the 50-item DREEM, which was developed by Roff et al. in the Dundee University Medical School, United Kingdom in 1997 (Law and Meyer, 2011). This questionnaire was used to measure the educational environment in healthcare settings and in medical schools in particular (Miles et al., 2012). Beside the English version, the DREEM has been translated and utilized in many diverse countries which are not English speaking such as Indian (Mayya and Roff, 2004), Indonesia (Rochmawati et al., 2014), and Green (Kossioni et al., 2012). The DREEM instrument also was translated into Vietnamese with good content validity (Hoang, 2013). The Vietnamese version of the instrument had already been tested to ensure internal consistency reliability with the overall Cronbach's alpha coefficient was 0.94 and five subscales ranging from 0.74 to 0.85. Each item is scored on a five-point Likert scale (from 0 = strongly disagree to 4 = strongly agree). The total score of the DREEM was used to assess the student's educational environment which was classified into four levels as poor educational environment (0–50 points), significant problem (51–100), more positive educational environment (101–150), and ideal educational environment (151–200; McAleer and Roff, 2001).

2.4. Data collection procedure

Data were collected using an online survey questionnaire, which was sent to nursing students with the support of local university nurse lecturers. Specifically, the survey form was posted to the nursing groups and forums in 10 nursing schools to ensure the questionnaire was answered correctly by nursing students. Participants could answer by any devices with internet access like cell phones, laptops, and tablets. Students were informed that the decision to participate in this study is voluntary without any financial benefits, and no disadvantages incurred if they decided to not participate. Also, they had been provided the link to project's information sheet, information on the confidentiality, and anonymity of the data collection before they completed the main survey. To prevent the rate of duplication, the online survey was set in mode "Limit to one response." The submission of the completed online survey indicated they had given their consent to participate in this study.

2.5. Data management and analysis

Statistical analysis was performed by Stata 16.1. Descriptive statistics were used to summarize the participants' characteristics as well as the level of workload, perceived generic skills, and educational environment.

Structural equation modeling (SEM) was employed to determine whether the association between the students' workload and the perceived generic skills can be mediated by the educational environment. The data in this study had normal distribution as the analysis showed that the skewness values ranged from 0 to 0.1 and the

Kurtosis values ranged from 0 to 0.8 for all variables. To test model fit, the study used the goodness of fit indices including the chi-square test ($p < 0.05$), the root mean squared error of approximation (RMSEA ≤ 0.06), the comparative fit index (CFI ≥ 0.95), the Tucker-Lewis Index (TLI ≥ 0.95), and the standardized root mean square residuals (SRMR ≤ 0.08) were used (Kline, 2015).

3. Results

3.1. Participant characteristics

A total of 1,347 Vietnamese nursing students were recruited in this study. The result showed that the average students' age was 22.40 ± 4.39 years (Table 1). Among those, 1,031 students (76.54%) had been studying in public schools. More than half of the study participants were in the second year (29.18%) and fourth year (26.8%). The majority of them 81.81% did not participate in social groups and 58.50% of students stated that "they had not known any student affairs/services in school."

3.2. Workload, educational environment, and generic skills among nursing students

As shown in Table 2, the total score of the students' workload and the generic skills were 3.25 ± 0.59 and 3.84 ± 0.56 (possible score: 1–5), respectively. This finding indicated that students were at "agree" level regarding "the sheer volume of work to be got through in this course means student can't comprehend it" and "as a result of doing this course, student feels more confident about tackling unfamiliar problem." The students' perception regarding the educational environment and the generic skills were 120.75 ± 20.78 . Most of nursing students rated the educational environment at levels of "more positive educational environment" ($N = 1,018, 75.58\%$). However,

TABLE 1 Participant characteristics.

Variables		Frequency (n)	Percentage (%)
Type of school	Public school	1,031	76.54
	Private school	316	23.46
Gender	Male	138	10.24
	Female	1,209	89.76
Student's year	Year 1	230	17.07
	Year 2	393	29.18
	Year 3	345	25.61
	Year 4	361	26.80
	Year 5	18	1.34
Social group participation	No	1,102	81.81
	Yes	245	18.19
Student affairs/services in school	No	788	58.50
	Yes	559	41.50

TABLE 2 The workload, the educational environment, and the generic skills among nursing students.

Variables	Mean±SD	Possible score
Student workload	3.25 (0.59)	1–5
The workload is too heavy	3.44 (0.85)	1–5
There is a lot of pressure on you as a student here	3.53 (0.89)	1–5
The sheer volume of work to be got through in this course means you cannot comprehend it all thoroughly	3.47 (0.88)	1–5
We are generally given enough time to understand the things we have to learn	2.55 (0.79)	1–5
It seems to me that the syllabus tries to cover too many topics	3.25 (0.87)	1–5
The generic skills	3.84 (0.56)	1–5
As a result of doing this course, I feel more confident about tackling unfamiliar problems	3.81 (0.65)	1–5
This course has helped me to develop my problem-solving skills	3.86 (0.61)	1–5
This course has sharpened my analytic skill	3.82 (0.64)	1–5
This course has improved my written communication skills	3.83 (0.64)	1–5
This course has helped me develop the ability to plan my own work	3.85 (0.62)	1–5
This course has helped develop my ability to work as a team member	3.91 (0.66)	1–5
The educational environment (The DREEM)	120.75 (20.78)	0–200
Students' perceptions of learning	29.52 (5.31)	0–48
Students' perceptions of teachers	26.73 (5.06)	0–44
Students' academic self-perception	21.88 (3.69)	0–32
Students' perception of atmosphere	26.37 (5.63)	0–48
Students' social self-perceptions	16.26 (3.22)	0–28

about 15% ($N = 202$) of students still perceived their educational environment as “significant problem.”

3.3. Relationship between workload and generic skills

As could be seen in Table 3, the study used structural equation modeling to assess the relationship among workload, the educational environment, and the generic skills. The results showed good fit indices with the chi-square test having a significant level of $p < 0.001$, RMSEA = 0.00, CFI = 1.0, TLI = 1.0, and the SRMR = 0.00 which indicated an acceptable fit for this model (Kline, 2015).

The results showed the total effect of workload on generic skills was -0.07 if there was no mediator in our model, at $p = 0.02$.

3.4. Mediation role of educational environment in the relationship between workload and generic skills

Next, to check mediating effect, the direct and indirect effects of workload (the predictor) on generic workload (the outcome) have been computed (in Table 3). The direct effect for workload was -0.00035 which was not significant ($p = 0.987$) with the generic skills. The indirect effect of workload that passes through the educational environment was -0.07 and is also statistically significant, at $p = 0.002$. This result, therefore, indicated the environment was a complete mediator in the relationship between the student workload and the

perceived generic skills. Additionally, the mediation model of workload and educational environment on generic skills with standardized betas was also shown in Figure 3.

4. Discussion

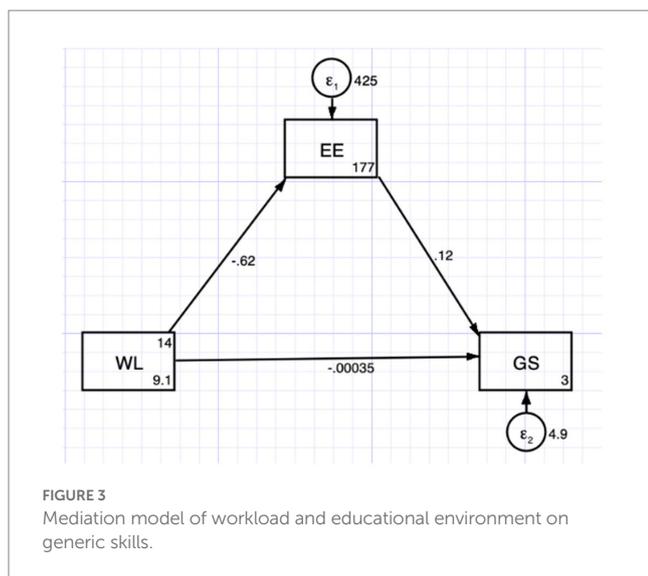
The objective of this study is to investigate the mediation role of educational environment in the relationship between student workload and generic skills among nursing students in Vietnam.

The average workload score provided by students in our study was 3.25 (SD = 0.59), which is higher than the scores provided by students in China or the United Kingdom (the UK) who completed the same questionnaire (Richardson, 2005; Yin and Wang, 2015) demonstrating that our project’s participants had higher level of perception regarding heavy workload compared to students in China or the United Kingdom. Additionally, the statement “there is a lot of pressure on you as a student here” obtained the highest perception score in the current study, demonstrating that pressure is the primary element of workload that hinders students’ ability to learn.

Since our study conducted during the COVID-19 pandemic in Vietnam. The negative effects of the COVID-19 outbreak on higher education may have also increased the students’ overall workload. Many higher education institutions in Vietnam had to shift from traditional face-to-face training to “remote teaching and learning” to respond and adapt with the pandemic context (Pham and Ho, 2020). Consequently, there were certain difficulties faced by students when learning online, such as a lack of technical expertise and experience, restricted communication with lecturers, and a decline in concentration in online classrooms as a result of growing confusion

TABLE 3 Total, direct, and indirect effects of workload on generic skills.

Path	Std. Beta	Value of <i>p</i>
Total (Workload → Generic skills)	-0.07	0.02
Direct (Workload → Generic skills)	-0.00035	0.987
Indirect (Workload → Educational Environment → Generic skills)	-0.07	0.002



and annoyance (Dhawan, 2020; Therisa Beena and Sony, 2022). Furthermore, during the COVID-19 outbreak, a high volume of nursing students across Vietnam volunteered to assist healthcare workers in COVID-19 prevention, detection, and treatment (Tran et al., 2020). Returning from the frontline, the students' intense workload may have been compounded when they resumed their studies to complete the course. It is, therefore, recommended that nursing students should be instructed in efficient learning strategies to help them manage their academic workload, particularly during unexpected situations such as the COVID-19 pandemic.

Students assessed a high score for generic skills that was 3.84 (SD = 0.56) which is higher than that of participants in the study conducted by Yin and Wang (2015) (Mean = 3.65, SD = 0.58). Teamwork received the greatest rating from students when compared to the other skills in this study. With mean scores ranging from 3.81 to 3.86, the remaining talents in this study—such as handling ambiguous situations, problem-solving, communication, analytical skills, and the ability to plan one's own work—were also highly ranked. The authors claimed that the nursing students who participated in this study acquired a range of vital skills that would enable them to engage in student-centered learning activities in the classroom and get ready for their future jobs (Yin and Wang, 2015).

Our study found that the total mean DREEM score of participants was 120.75 (SD = 20.78) suggesting nursing students had a positive perception of their learning environment. The finding is supported by the results of various studies conducted abroad (Fuenzalida et al., 2018; Nayak, 2019; Kadam et al., 2020) as well as a study conducted at four different nursing universities in Vietnam (Ramsbotham et al., 2019). This may be because nursing courses in these studies placed a strong focus on student-centered learning, which is indicative of curriculums with high DREEM score (Rochmawati et al., 2014). Since

nursing students in our study had a positive opinion of their learning environment despite the COVID-19 outbreak in Vietnam, the integration of face-to-face training and online instruction using flip classroom methods is recommended (Pham and Ho, 2020).

The result of structural equation modeling revealed relationships between nursing students' opinions of their learning environment, study load, and their overall skill sets. A heavy workload may prevent students from developing generic skills, such as problem-solving, communication, making plans, and teamwork abilities, which are frequently regarded as learning outcomes. The significant relationship between workload and generic skills was consistent with those earlier findings (Yin and Wang, 2015; Cheung et al., 2020). While it may be somewhat useful to lessen study load for the progress of students' general skills, it is evident that in order to have a positive influence, students' workloads should be kept within a reasonable range based on their academic accomplishments (Cheung et al., 2020). As shown in mediation analysis, a good or exceptional learning environment encourages students to develop their generic skills. It also demonstrated that students' views of the learning environment were a reliable indication of how highly they judged the growth of generic skills. Similar to this, a Chinese study of 885 medical students discovered that the educational environments of groups with high (123/200), medium (118/200), and low (113/200) levels of learning outcomes scores were noticeably different (Sun, 2003). This outcome demonstrates how crucial the learning environment is in assessing students' learning outcomes. Since then, it is encouraged educators and nursing schools should constantly innovate teaching methods that contribute to providing a realistic learning environment and proper support for nursing students. Such efforts are imperative to enhance learning outcomes as well as overall students' satisfaction.

Finally, the educational environment was acknowledged as a mediator to explain the links between the workload of students and their general skills. Despite the fact that students may face a high volume of study load, it is a good idea for nurse instructors and nursing schools to emphasize the need for an enhanced learning environment. This will help students learn more by boosting their overall abilities.

4.1. Strengths and limitations

Despite of being undertaken during the COVID-19 pandemic, this study still has a few of strengths. Firstly, the study included undergraduate nursing students in 10 institutions across Vietnam with a diversity of regions, cultures, and types of schools (public vs. private). Therefore, our results are likely representative of the nursing student population in Vietnam. Secondly, to our best knowledge, this is the first and largest study to assess the educational environment as a mediator in the relationship between the student workload and the generic skills in the nursing field, which has not been well depicted in the literature. The study results, therefore, provide evidence for teaching and learning practices as well as further research in exploring the educational environments in other contexts.

However, our study had several limitations. First of all, there may not have been adequate control over the quality of the responses due to the snowball sampling technique used in this online survey. Secondly, this study used a cross-sectional design and the SEM results,

which did not provide evidence of causation among variables. Lastly, the degree of organizational support, the level of Covid-19 vaccination, and the infectious state are affecting the relationships between three main variables were not extensively examined in our study. Future studies should consider these effects while implementing their research.

5. Conclusion

Despite students' perceptions of a favorable learning environment and the development of general abilities, their workloads were a factor that needed to be taken into account. Additionally, a key conclusion was that the association between student workload and generic skills was mediated by the educational environment.

From there, we recommend that, to enhance students' generic skills, it is necessary to instruct students in efficient learning strategies to help them manage their academic workload, particularly during unexpected situations such as the COVID-19 pandemic. Additionally, it is essential to recognize that the students' workload is directly influenced by the policies and teaching curriculum of their respective educational institutions, making sometimes a challenge to reform. As such, nursing schools could focus on efficient tactics and interventions to improve the educational environment, which subsequently helps to improve students' outcomes.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The study involving human participants was reviewed and approved by Vinmec International General Hospital

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Author contributions

TN and VH contributed to the conception and design of the study. TN, HB, HP, and VH contributed to organizing the database and wrote the manuscripts. All authors contributed to the article and approved the submitted version.

Acknowledgments

We would like to thank Hannah Yeboah for her language editing of this manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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