



Learning Nursing During the Covid-19 Pandemic; Teacher-Support is Exceptionally Important

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Abstract

Background: The Covid-19 pandemic affects both students and teachers with its sudden change in study design, causing students studying remotely at home with much uncertainty, and minor relatedness. By only use of digital tools, teacher-support has possibly worsened, affecting students' motivation, study-effort and learning.

Aim: To investigate the associations between teacher-support, students' intrinsic motivation, study-effort and learning during the pandemic.

Methods: In a cross-sectional design, quantitative data were collected from 329 nursing students at a large university in Norway. Six hypotheses of the associations between teacher-support, intrinsic motivation, study-effort and learning were tested by means of structural equation modelling. To gain more understanding, qualitative data were included.

Results: Teacher-support showed significant direct effects on students' learning and intrinsic motivation, as well as significant indirect effects on learning mediated by intrinsic motivation and study-effort.

Conclusion: Teacher-support is important to students' learning, when teaching goes digitally in the context of a pandemic. To facilitate students' learning teachers should provide students with structure and study demands, accompanied by a follow-up. To meet students' demands and needs teachers need support by their employer to be fully prepared technologically.

Keywords

Digital learning, Teacher-support, Study-effort, Covid-19, Pandemic

Introduction

The Covid-19 pandemic affects both students and teachers with its sudden change in studying and teaching. The transition from traditional classroom education to solely utilising technology as a tool for learning represents a major challenge for the healthcare education globally. Thus, the Covid-19 pandemic has left students studying remotely at home with much uncertainty, and minor contact with peers and teachers. In recent studies, nursing students report stress, loneliness and mental health problems during the pandemic [1,2], resulting in sleeplessness, problems with concentration and efficiency when studying at home [1,2]. They experience a lack of structure and discipline, motivation and difficulties in "getting started", accompanied by limited opportunities to meet other students [1]. Recent studies show that nursing students report higher stress and anxiety during Covid-19 pandemic [3,4] due to economic uncertainty, infection risk

and having to deal with the challenges with social lockdown [4,5].

However, the pandemic caused a positive effect of flexibility: Digitally recorded lectures and digital tools for learning are available whenever the students want to work on them. In their preparations, students can study at their

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own pace, at their own time, and thus experience flexibility. Recently, students with higher academic qualifications and health literacy reported positive outcomes such as knowledge and a comprehensive understanding of the pandemic situation: These students were able to take preventing measures to cope with the situation [6]. A qualitative Spanish study showed that nursing students with other obligations such as work and family responsibilities reported a poorer adaptation to e-learning activities [7].

Currently, few studies have investigated the impact of the Covid-19 pandemic on nursing students' motivation, study-effort, learning and teacher-support. However, several studies have investigated the importance of motivation involving teacher-support in an educational context prior to the pandemic [8-11]. Equal to the concept of motivation, the 'relatedness-with-teacher' construct covers different aspects including 'instrumental support': This refers to student's perception of available instrumental resources and practical help to solve problems or difficult tasks [12,13].

Self-determination theory (SDT)

The Self-Determination Theory (SDT) focuses on individuals motivation-related qualities and motives, which regulate their behavior within a social context [10,14]. The SDT claims that motivation is a multidimensional concept that varies in quality. Therefore, the SDT distinguishes between different kinds of motivation based on the individual's goals for action. The concept of motivation covers different motivational aspects along a continuum of internalization, from non-regulation to internal regulation [15,16].

The motivational aspect termed 'intrinsic motivation' represents a type of autonomous motivation, which embraces the experience of will and choice including an individual's integration and regulation of one's personal motives. Intrinsic motivation occurs when individuals do an activity because of inherent interest and enjoyment. Autonomous motivation has proven to be the most effective on students' engagement, learning and wellness [10,14].

According to SDT, all people have three basic psychological needs: (1) Relatedness, (2) Autonomy and (3) Competence. Students need to feel free to choose (autonomy), experience that they master activities in which they are involved (perceived competence) and feel connected to other people (relatedness). To achieve optimal growth and development, and thus learning, these three needs must be fulfilled [10,14]. Autonomously chosen activities are motivated by satisfaction of the needs and perceived benefit [17]. Having options of how to do or present one's work within a structure make students feel autonomous, whereas a sense of competency occurs when students perceive their own actions as effective and efficient [10,18]. Students feel competent when they can meet their study challenges, and perceive progression in developing skills or understanding of the course material [10,15,18]. Accordingly, research discloses that autonomous motivation associates with higher study-effort [19]. Introducing learning activities that are optimally challenging and simultaneously explaining the learning benefit of these activities are autonomy supportive [15].

Flipped classroom and technology

To fulfil the three basic needs mentioned above, the pedagogical model flipped classroom can be applied [20,21]; autonomous motivation and thereby students' intrinsic motivation are achieved when students are stimulated to acquire knowledge through pre-class and in-class activities. Instructors organize the course content by means of pre-class activities such as study-guides, video-lectures and podcasts online. The in-class activities involve reflection, discussion and problem solving, and the interaction with the teacher and fellow students contributes to open discussions and reflections, as well as immediate feedback. In student preparation, both prior to and during in-class activities, technology is used to engage and motivate students [20,21].

Previous research reveals that user training and teacher-support are necessary when introducing e-learning technology in courses [8,11]. Strong support from teachers positively affects students' motivation [8]. Teachers who clearly communicate the importance of doing e-learning activities facilitate students' involvement, while lack of motivation when starting a course generally predicts worsened motivation and less participation over time [9]. Students who report more autonomous motivation are more likely to engage in e-learning modules, as well as making a greater study-effort [22].

Aims

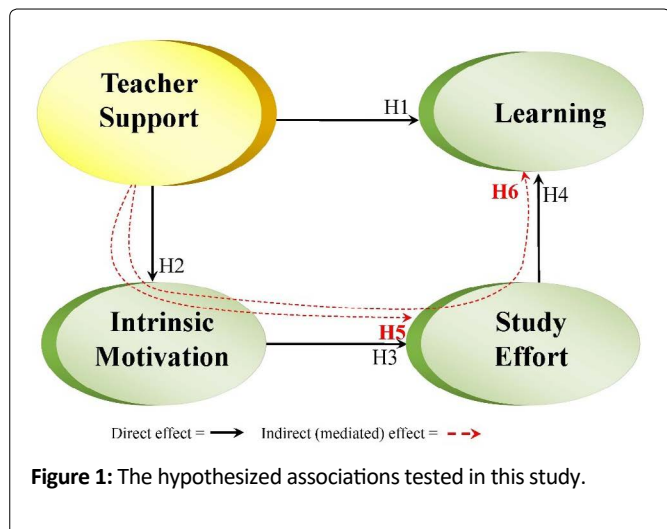
The present study investigates the associations between teacher-support, and students' intrinsic motivation, study-effort, and learning during the Covid-19 pandemic. Furthermore, this study explores students' experience of motivation and study-effort related with digital teaching and learning. The research questions were: (1) "When teaching goes digitally, how does teacher-support affect nursing students' intrinsic motivation, study-effort and learning", and (2) "The constructs intrinsic motivation, study-effort and learning, how do they interrelate?" The following six hypotheses (Figure 1) concerning nursing students were tested by means of structural equation modelling:

1. Hypothesis 1 (H1): Teacher-support directly affects students' learning.
2. Hypothesis 2 (H2): Teacher-support directly affects intrinsic motivation.
3. Hypothesis 3 (H3): Intrinsic Motivation directly affects study-effort.
4. Hypothesis 4 (H4): Study-effort directly affects learning.
5. Hypothesis 5 (H5): Teacher-support indirectly affects study-effort mediated by intrinsic motivation.
6. Hypothesis 6 (H6): Teacher-support indirectly affects learning mediated by intrinsic motivation and study-effort.

Methods

Participants

This study is part of a larger Norwegian study of learning nursing, focusing on student-active learning methods,



different types of teacher-support, students' motivation and mastery. The nursing education at a large university in Norway was included. The university's management unit approved the study. In a cross-sectional design, data were collected during 2020; all nursing students (1st year, 2nd year and 3rd year) during spring 2020 in addition to first year students in autumn 2020 were included (N = 883). The potential participants received information about the study by mail and announcements on the students' learning platform, with a three-time reminder to participate. Out of 883 nursing students, 329 participated (response rate 37%) by voluntarily responding to an online questionnaire and thereby providing their consent to participate.

Measurement

The scales were assessed in the following order: 1) Teacher-support; 2) Intrinsic motivation with the Academic Motivation Scale (AMS); 3) Study effort with the Intrinsic Motivation Inventory (IMI), and 4) Perceived learning.

The four scales were scored on a 7-point scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree") with a midpoint of 4 ("Neither"). Appendix 1 displays the full scales.

Teacher-support: The validated items concerning instrumental support [12] were applied. We scoped the tangible support, helping students understand what to learn and how to attend the different tasks as all learning activities became digital. Instrumental support was adjusted to our context.

Intrinsic motivation: Vallerand and colleagues [23] developed the AMS including the dimension of intrinsic motivation for knowledge. AMS was found reliable and valid among vocational health and social-care students in Norway [16].

Study-effort: Was assessed by the Intrinsic Motivation Inventory (IMI) [24,25] focusing on the student's subjective experience of study-effort related to spring-autumn 2020.

Perceived learning: Two validated items [18] assessed perceived learning. Applying the three-indicator rule [26], we included one more item.

Statistical Analysis

The data were analyzed by descriptive statistics using IBM SPSS version 27 [27]. The hypothesized relations between the latent constructs of teacher-support, intrinsic motivation, study-effort and learning were tested by means of structural equation modelling (SEM) using Stata 16 [28]. SEM-analysis accounts for random measurement error and thus provides a more accurate test of the psychometric properties of the scales involved. Missing data were low in frequency and handled by means of the Listwise procedure. Research has indicated that Cronbach's α cannot be generally relied on as an estimator of reliability [29]. Therefore, composite reliability was estimated by means of the formula by Hair and colleagues [26] as shown in Table 2; a coefficient of ≥ 0.7 is good whereas estimates ≥ 0.6 are considered fair for both reliability coefficients [26,30,31]. For the correlation analyses, p-value was set to 1%, whereas the estimates based in SEM-analyses commonly include both 5% and 1% p-values. Factor loadings below 0.32 are considered poor, ≥ 0.45 fair, ≥ 0.55 good, ≥ 0.63 very good, and above 0.71 are excellent [32].

Model fit

Since the standard errors are estimated under non-normality, the Satorra-Bentler-scaled chi-square statistic was applied as a goodness-of-fit statistic, which is the correct asymptotic mean even under non-normality [33]. In line with the rule of thumb of conventional cut-off criteria [34] the following fit indices were used to evaluate model fit: chi-square (χ^2)-a small χ^2 and a non-significant p-value correspond to good fit [33], $\chi^2/\text{degrees of freedom}$ should be ≤ 2 for good fit, and ≤ 3 for an acceptable fit. Further, the root means square error of approximation (RMSEA) and the standardized root mean square residual (SRMS) with values ≤ 0.05 indicating good fit, whereas values ≤ 0.08 are interpreted as acceptable [34,35]. Also, the comparative fit index (CFI) and the Tucker Lewis Index (TLI) were used with an acceptable fit at 0.95/0.90 respectively, and good fit at 0.97/0.95 and above (ibid.).

Sufficient power analysis is dependent on the ratio between the total number of variables (error measurements, observed and latent variables) and the sample size; one observed variable per 10 participants is given as a rule of thumb [26,30,31]. Thus, in order to reduce model complexity, we tested the measurement models by CFA applying the three-indicator rule [26]. Considering the loadings, R^2 -values as well as the breath and nuances of the actual construct, the indicator variables were reduced to three for all four constructs/factors. Before examining the hypothesized relationships, the measurement model including the four constructs with 3 indicators each was tested by confirmatory factor analysis (CFA) using Stata 16 [28], revealing an acceptable fit [$\chi^2 (49) = 108.05, p < .00; RMSEA = 0.063; CFI = 0.97; TFI = 0.95; SRMR = 0.077$]. The standardized factor loadings were significant, ranging between 0.67-0.94 ($p < .01$). Composite reliability (ρ_c) ranged from 0.77 to 0.90, indicating good reliability.

Qualitative Analysis

To gain depth in the understanding of students' intrinsic

Table 1: Measurement models for teacher Support, intrinsic motivation, study effort and learning.

| Items | Parameter | Stata estimate ¹ | t-value | Bentler-Raykov squared multiple correlation ² R ² | Comoposite reliability ⁸ ρ _c |
|---|-----------|-----------------------------|---------|---|--|
| ³Teacher Support | | | | | |
| TS1 | λx1,2 | 0.82 | 28.14** | 0.67 | 0.84 |
| TS2 | λx1,3 | 0.81 | 27.36** | 0.65 | |
| TS3 | λx1,5 | 0.76 | 23.81** | 0.57 | |
| ⁴Intrinsic Motivation | | | | | |
| IM1 | λy2,3 | 0.67 | 15.39** | 0.45 | 0.77 |
| IM2 | λy2,6 | 0.77 | 18.84** | 0.60 | |
| IM3 | λy2,9 | 0.70 | 16.55** | 0.50 | |
| ⁵Study Effort | | | | | |
| SE1 | λy3,1 | 0.94 | 58.45** | 0.88 | 0.90 |
| SE2 | λy3,4 | 0.87 | 44.39** | 0.75 | |
| SE3 | λy3,7 | 0.78 | 30.90** | 0.61 | |
| ⁶Learning | | | | | |
| Learning1 | λy4,2 | 0.74 | 22.16** | 0.54 | 0.83 |
| Learning2 | λy4,5 | 0.84 | 31.50** | 0.70 | |
| Learning3 | λy4,8 | 0.80 | 27.81** | 0.63 | |

Note: **Significant at the 1% level; 1. Completely Standardized Factor Loadings; 2. The Bentler-Raykov squared multiple correlation coefficient = R². ³TS = Teacher Support ⁴IM = Intrinsic Motivation. ⁵SE = Study Effort. ⁶Learning = Learning scale. Listwise N = 305, Missing N = 24 (0.3%) 12 items included.

$${}^8\text{Composite reliability } \rho_c = \frac{(\sum \lambda)^2}{(\sum \lambda)^2 + \sum(\theta)}$$

Table 2: Mean, Cronbach’s alpha, and correlation coefficients for the study variables.

| Construct | Mean (sd) | Items | Cronbach’s Alpha | ¹ TS | ² IM | ³ SE | ⁴ Learning |
|-----------------------|-------------|-------|------------------|-----------------|-----------------|-----------------|-----------------------|
| ¹ TS | 4.14 (1.35) | 3 | 0.84 | 1 | | | |
| ² IM | 6.03 (.761) | 3 | 0.76 | 0.25** | 1 | | |
| ³ SE | 4.63 (1.60) | 3 | 0.89 | 0.06 | 0.19** | 1 | |
| ⁴ Learning | 4.40 (1.27) | 3 | 0.83 | 0.46** | 0.17** | 0.37** | 1 |

Note: **p-value < 0.01; ¹TS = Teacher Support; ²IM = Intrinsic Motivation; ³SE = Study Effort; ⁴Learning = Learning scale; Listwise N = 305, Missing N = 24 (7.3%).

motivation, study-effort, learning and teacher-support, qualitative data were included as responses to open questions in the survey: “How has the period of the Covid-19 pandemic affected your motivation to become a nurse?”, and “Can you elaborate why your work effort with the studies has been less, similar or greater during the period of the Covid-19 pandemic?” These data were analyzed by utilizing Kvale and Brinkmann’s [36] analytical strategy, involving three steps: (1) Opinion concentration; (2) Densification of meaning and (3) Interpretation of meaning [36].

Results

Descriptive analysis

Totally, 329 nursing students participated. Missing data were N = 24 (7.3%), giving a Listwise N = 305. The sample consisted of 286 women (87%) and 43 men (13%). Table 2 displays the means, standard deviations, Cronbach’s α, and Pearson’s correlation matrix for the latent study variables. The correlations between the measures were in the expected direction showing moderate correlations. The α-levels for the various measures indicate acceptable inter-item consistency with Cronbach’s alpha coefficients (Table 2).

Model testing and model fit

SEM-analyses: To investigate how Teacher-support related to Intrinsic Motivation, Study-effort and Learning, as well as how the dependent latent variables were inter-related, we estimated a SEM-model comprising 12 indicators. For scaling, the variances of the dependent latent variables were set to 1. Table 1 lists the measurement model with factor loadings, t-values, R²-values, and composite reliability. All factor loadings were significant, showing good estimates ranging from 0.67 to 0.94, with R²-values between 0.45-0.88. Composite reliability ranged between 0.77-0.90 (Table 1).

Figure 2 portrays the SEM-model showing the measurement models, structural regression coefficients and the fit indices.

The SEM-model yielded a good fit to the data (χ² = 89.78, p = 0.0001, df = 50, χ²/df = 1.8, RMSEA = 0.051, p-close 0.437, CFI = 0.98, TLI = 0.97, SRMR = 0.039). Table 3 shows the standardized regression coefficients of the direct and indirect (mediated) effects between the latent constructs in the SEM-model.

Table 3: SEM-model. Direct, indirect and total effects between the latent constructs teacher support, intrinsic motivation, study effort, and learning.

| Construct | | Parameter | | |
|---|-----------------|-----------------------------|-----------------------|-----------------------|
| Direct effects between the latent constructs | | | | |
| | | Learning⁴ | IM² | SE³ |
| TS ¹ | γ 1,2 | 0.54 | 0.14 | - |
| | t-value | 8.25** | 3.97* | - |
| IM ² | γ 1,3 | - | - | 0.53 |
| | t-value | - | - | 2.80* |
| SE ³ | γ 1,3 | 0.32 | - | - |
| | t-value | 6.95** | - | - |
| Indirect effects between the latent constructs | | | | |
| | | Learning⁴ | IM² | SE³ |
| TS ¹ | ${}^6\beta$ 1,2 | 0.024 | 0.33 | 0.08 |
| | t-value | 2.26* | 1.68 | 2.37* |
| IM ² | ${}^6\beta$ 3,2 | 0.17 | 0.71 | - |
| | t-value | 2.60* | 9.94* | - |
| SE ³ | β 4,5 | - | - | - |
| | t-value | - | - | - |
| Total effects between the latent constructs | | | | |
| | | Learning⁴ | IM² | SE³ |
| TS ¹ | γ 1,2 | 0.56 | 0.14 | 0.074 |
| | t-value | 8.44** | 3.97** | 2.37* |
| IM ² | γ 1,3 | 0.17 | - | 0.52 |
| | t-value | 2.60* | - | 2.80** |
| SE ³ | γ 1,3 | 0.32 | - | - |
| | t-value | 6.95** | - | - |

Note: *Significant at the 5% level, **Significant at 1% level. Listwise N = 305, Missing N=24 (7.3%); ¹Gamma (γ); standardized regression coefficients representing directional relationships between ²TS = Teacher Support; ³IM = Intrinsic Motivation; ⁴SE = Study Effort; ⁵Beta (β); standardized regression coefficients representing directional relationships between IM, SE and Learning.

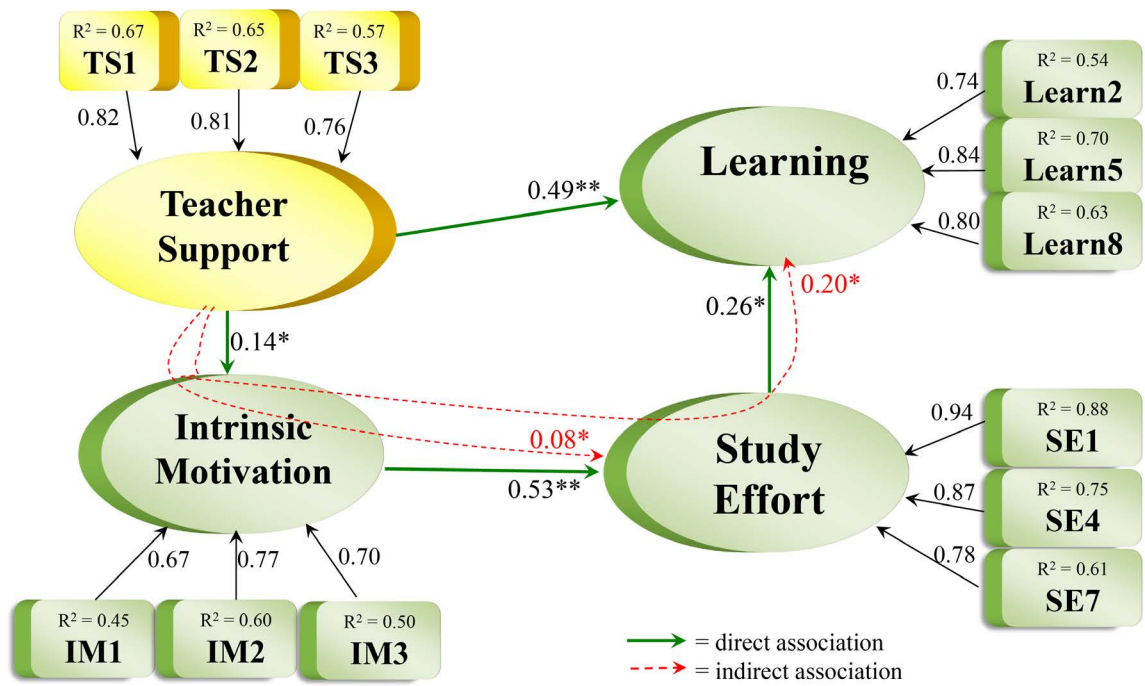


Figure 2: SEM-model.

Note: SEM-model showing the measurement models of the latent variables and regressions coefficient of the directional and indirect paths between the latent constructs. Standardized Stata estimates. Model fit is good: ($\chi^2=89.78$, $p=0.0001$, $df=50$, $\chi^2/df=1.8$, RMSEA=0.051, p-close 0.437, CFI=0.98, TLI=0.97, SRMR=0.039). Listwise N = 305, missing N = 24 (7.3%).

According to Figure 2 and Table 3, significant directional paths appeared from teacher-support to learning (H1: $\beta_{1,1} = 0.49$) and intrinsic motivation (H2: $\gamma_{2,1} = 0.14$). Furthermore, the direct relationships (Table 3) between the dependent variables, as assumed in H3 and H4 displayed significant values from intrinsic motivation to study-effort ($\beta_{1,3} = 0.53$) and from study-effort to learning ($\beta_{2,3} = 0.26$). Looking at the indirect effects representing the mediated influence, teacher support revealed significant impact on students' study-effort (H5) mediated by motivation, as well as on learning (H6) mediated by motivation and study-effort. Thus, all hypotheses H1-H6 found support.

Qualitative Data

The qualitative data enlightened the quantitative findings concerning 1) Motivation to become a nurse; 2) Study-effort; 3) Teacher-support, and 4) Learning.

Motivation to become a nurse

Despite the pandemic with its demanding consequences for health personnel worldwide, several nursing students stated that their motivation to become a nurse was unchanged, holding a long-term desire to work as a nurse:

"It has not affected my motivation that much; I wanted to study nursing since long".

Others revealed that paid work and socialization with other nurses during the pandemic strengthened their motivation:

"The corona-pandemic has clearly enhanced my motivation to become a nurse. Now, the urge to make a difference is even stronger".

The pandemic and its consequences caused an increased respect for the nursing profession:

"Less motivation to complete school assignments, but stronger motivation to become a resource for society, and pride in how important the nursing profession is".

Nevertheless, facing the pandemic and the large number of severely ill and dying people, some students felt scared and were unsure if they wanted to work as a nurse in the future:

"I feel that a positive view has been directed at nurses' work, and this provides increased motivation. Still, there are aspects, which make me insecure... Heavy workload mentally scares me a little. Not sure if I am mentally strong enough to deal with such situations around Covid-19 as a nurse".

Study-effort

The students assigned that a high study-effort was important to learn and achieve good results:

"I have worked hard with my studies to get the results I aim for. During the corona-period, a lot of uncertainty, little access to literature, teacher-guidance and contact with other fellow students made it hard to study. Sitting at home, left with minor structure and a distinction between leisure and work was challenging".

Nevertheless, study-effort varied. Some students maintained high responsibility for their learning through self-studying, whereas others revealed a low study-effort. The latter group included students who did not know or understand how to reach the specified learning outcomes:

"Less obligations, difficult to get an overview and know what to spend time on".

Studying was more demanding when the teaching differed from usual, but some students felt they maintained a high study-effort. Due to minor social activities during the pandemic, some chose to study more than before. However, several students explained that absence of structure and scarcity of demands by the educators caused less motivation and lower study-effort.

As a replacement for studying, several students chose to work in health care facilities; they found it difficult to say no in the context of the global pandemic:

"My studying has been characterized by much work at the hospital; great demands for personnel has made it difficult to say no. This has affected my study-effort so that I have had to work with my bachelor after/before work".

Teacher-support

Some students experienced close follow-up by a teacher:

"I think my institution is good at facilitating that we get as good a learning situation as possible during the corona pandemic. So, the motivation is the same as before".

However, others experienced lesser learning and competence development resulting from a deficiency of follow-up and teacher contact. Many yearned for guidance, in order to manage self-studying:

"It has been less due to little motivation because the teachers had been so absent and not helpful. As well as little information and get assigned tasks that we have never worked with before".

"Generally, been poor follow-up, it is not easy to discuss with teachers via digital tools".

Learning

Some students described that they are accustomed to take responsibility for their own learning: *"Likewise because I am used to being responsible for my own learning"*, while others found online digital teaching less efficient:

"I think I spend more time than I would have done on studying, since it takes longer to learn things when you have to read on your own. Also think it's a little harder to keep up with ZOOM".

Some were uncertain and somewhat helpless concerning how to study and learn the required theoretical and practical skills by means of self-study. This caused less self-study and less learning:

"Little structure and information have made it difficult to know what I should focus on when I first have time".

Discussion

In 2020, the Covid-19 pandemic caused all university teaching in Norway to go digitally. In this context, the present study explores how teacher-support influences nursing students' intrinsic motivation, study-effort and learning, as well as how teachers can support students in their transit from traditional classroom activities to solely digital learning activities. Our hypotheses stated that teacher-support directly would affect nursing students' learning, intrinsic motivation and indirectly study-effort and thereby learning. All six hypotheses tested were supported at the 5%-level. We could show significant associations between teacher-support and students' intrinsic motivation, study-effort and learning. Additionally, our results showed statistically significant associations between the dependent latent constructs of intrinsic motivation and study-effort, and between study-effort and learning.

Teacher-support relates significantly to intrinsic motivation, study-effort and learning.

More specifically, a significant impact of teacher support on intrinsic motivation and learning revealed, as well as significant indirect influences on study effort and learning, mediated by intrinsic motivation and study effort, respectively. Our results showed that teacher-support seems to have an outstanding position as a resource for nursing students' learning, intrinsic motivation and study-effort during the Covid-19 pandemic. In this study, three items assessed 'Teacher-support': (1) "the teachers help me to understand what should be focused on in the actual course"; (2) "when working with written submissions such as internship assignments and bachelor thesis, the teachers direct me how to perform the different tasks", and (3) "when technical problems emerge the teachers help me solving the problem". Correspondingly, if teachers guide nursing students' awareness about what to learn, how to work with the tasks and offer support in technical problems, they enhance learning: in the present study learning embraces students' experiences of having learned a lot, understanding the content well and feel confident that he/she will achieve the learning goals of the actual topic. Probably, such support by the teacher is ever more important during the pandemic. The qualitative data showed that absence of structure and scarcity of demands by the educators caused lower motivation and less study-effort. These findings are in correspondence with previous research that students need to study within a structure to feel autonomous [18,10]. Furthermore, as a replacement for studying, nursing students worked in healthcare facilities. Probably, they gained some clinical learning by this strategy. Nevertheless, the qualitative data highlighted the importance of teacher-student contact and follow-up. The students felt uncertain and helpless in both theoretical and clinical learning. They needed support to cope with the "self-study-at-home" situation.

In recent studies, nursing students report stress, loneliness and mental health problems during the closedown of the universities due to the Covid-19 pandemic [1,2], resulting in sleeplessness, problems with concentration and efficiency when studying at home [37]. Hence, it is understandable

that teacher-support remains exceptionally important in this context. The present data expose that teacher-support enhances students' intrinsic motivation, which is fundamental for their study-effort. These findings correspond with previous research showing that teachers who address the basic needs of autonomy, perceived competence and relatedness contribute to autonomous motivation, which associates with increased study-effort [18,19,15].

This study assessed intrinsic motivation by items covering students' joy and satisfaction related to learning and pleasure from increasing ones' knowledge in the actual topic, as well as the sense that the actual education provides an opportunity to learn about interesting aspects. Hence, teacher-support boosts nursing students' joy and satisfaction of learning, their experience of interest in the actual topics and thereby their study-effort and learning.

The SDT states that relatedness, competence and autonomy are interrelated dimensions of significance to learning [10,14]. When students must study alone, at home, the relatedness component is suffering. The teachers are only digitally present in a limited time. Probably, this affects the motivation to study negatively, and the students' study-effort might decrease. Consequently, the same goes for their learning, which is worrying. Considering this working situation at home alone studying, the autonomy dimension seems negatively affected too. Nonetheless, as demonstrated by the qualitative data, some students had a strong independent character, high intrinsic motivation and were accustomed to take responsibility for their learning. Such students will indeed cope well with the Covid-19-situation concerning learning. However, most students are dependent on teacher-support [15,17,18]. To act autonomously, students need a teacher-student relationship providing guidance in understanding the material or how to work with it. With support they are able to study more autonomously, indicating a greater sense of competency and satisfaction in their study-work [15,17,18].

The interrelations between intrinsic motivation, study-effort and learning

The second research question aimed at investigating the inter-relationships between the dependent latent constructs of nursing students' intrinsic motivation, study-effort and learning. The latter is an explicit goal of all university teaching and education [10,13,18]. Intrinsic motivation showed a strong influence on study-effort and by this a significant impact on learning. The more autonomous motivation, the more autonomy and thus study-effort. Despite the effects of the pandemic, the qualitative data disclosed that students' motivation to become a nurse was unchanged or boosted. This intrinsic motivation is a resource for learning, which teachers should be aware and take advantage of in their teaching.

Students' transition from the traditional classroom to a digital classroom

This study also directed how educators successfully can support the transition from traditional classroom activities to use of digital learning activities in the nursing education

during the pandemic. Although digitally pre-class activities are used, the in-class activities might suffer. Discussions and reflection processes might suffer by lack of attachment. The qualitative data revealed that although some students experience a good relationship with their teachers through digital tools, others find it difficult to maintain a relationship with the educators and the university. Digital teaching is possibly less empowering for students. Consequently, teaching digitally should involve alternative empowering approaches of students' in their learning and competence development.

As demonstrated by the qualitative data some students yearned for teacher-support and felt that it had worsened. The sudden change of study-design toward utilizing solely technology might also have affected the teachers who were working at home coping with new digital tools and solutions. SDT maintains that for teachers to actively support their students' needs and learning, the teachers need support [14]. Thus, when introducing e-learning technology in courses it is mandatory to provide teachers with training and support [8,11]. This will be ever more essential during times of pandemics. For students to achieve their learning goals, clear communication about the importance of self-studying and actively participation in online education is important.

Strengths and Limitations

The empirical examination of associations of various constructs that are scarcely elucidated in the context of learning nursing during a pandemic is a notable strength of this research. This study expands previous research by testing the associations between teacher-support, students' intrinsic motivation, study-effort and learning among Norwegian nursing students utilizing SEM: A measurement technique, which includes estimates for random measurement error, and therefore derives the involved measurement models more precisely. This study builds on a strong theoretical foundation utilizing scales with good psychometric properties.

The SEM-model tested comprises 12 variables, indicating a desirable sample size of minimum $N = 120$ [30,26,38]. In this study, listwise $N = 305$, provides a strong statistical power of the tests. Nevertheless, the present findings must be discussed with some limitations in mind. Information input to the SEM-estimation increases with more indicators per latent variable, and with more sample observations. More indicators per latent variable would have strengthened the composite reliability (ρ_c) and the Cronbach's alpha (α). Still, both reliability coefficients (ρ_c , α) revealed very good estimates. Therefore, with reference to model complexity and statistical power we included three indicators for each of the latent constructs. Including more indicators and thus covering more nuances of the constructs might have affected the results.

The cross-sectional design implies that we cannot make conclusions on the causality. That is, we cannot define the direction of the paths with certainty [26]. Feasibly, the latent variables perform as both a predictor and an outcome of another construct. Despite a good fit, some alternative model might possibly fit better or be more accurate. However, the fit indices and composite reliability underpin the present

results. No problem with discriminate and convergent validity appeared, as we found good factor loadings indicating that the theoretical plausibility was good. All paths corresponded well to the theoretical basis, which support the findings. The qualitative data focused on students' motivation to become a nurse and their study effort during the first 6 months of the pandemic. Hence, the depth and breadth of these data are limited; still, 237 out of the 329 participants responded providing a broad picture of the students' experiences.

Conclusion

Teacher-support is tremendously important to students' learning, in particular when teaching goes digitally in the context of a pandemic. This study shows that students need teacher-support in order to maintain students' motivation, study-effort and thus learning. To facilitate students' learning in the course of self-studies alone at home, teachers should provide students with structure and study demands, accompanied by a follow-up. Moreover, alternative empowering approaches should be developed and integrated in the digital classroom. Teachers need support by their employer to handle digital technologies well and meet students' demands and needs.

Highlights

- Teacher-support is important to students' learning, especially when teaching goes digitally in the context of a pandemic
- Students need teacher-support in order to maintain motivation and study-effort and thus learning
- Concerning digital teaching, continuing follow-up by teachers is important to facilitate students' learning
- Teachers need support by their employer to manage digital technologies and meet students' expectations and needs

Conflict of Interest

The authors declare no conflict of interest.

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Appendix 1

Teacher support (TS):

TS1: The teachers' help me to understand what should be focused on in the actual course

TS2: When working with written submissions such as internship assignments and bachelor thesis, the teachers direct me in how to perform the different tasks

TS3: When technical problems emerge the teachers help me solving the problems

Intrinsic motivation(IM):

IM1: Because I experience pleasure and satisfaction while learning these courses

IM3: For the pleasure that I experience in broadening my knowledge about courses which appeal to me

IM4: Because my studies allow me to continue to learn about many things that interest me

Study effort (SE):

SE1: I put a lot of effort into my courses during this period

SE2: I tried very hard to do well in these courses

SE3: Actually, I didn't put much energy into my courses during this period

Learning

Learning 1: I felt that I learned a lot in these courses

Learning 2: I understand the content of the current courses well

Learning 3: I felt that I was able to learn what was expected to be learned in the relevant courses

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