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What does it mean to prepare for class? A case study on students' study habits in a nursing educational programme

Tobias Alexander Bang Tretow-Fish
Technical University of Denmark, Denmark

Bjarke Lindsø Andersen
University College Absalon, Denmark

Thilde Emilie Møller
University College Absalon, Denmark

Anne-Mette Nortvig
University College Absalon, Denmark

Abstract

This article presents findings from a research project that aimed to replace physical books with an adaptive learning platform, Area9 Rhapsode™, for nursing students' class preparation. As the project expanded, it became evident that students employed diverse preparation practices, prompting an investigation into their preparation habits. This is done through the following research questions: (1) how do students feel about class preparation? (2) what learning resources do students choose? (3) when and where do they prepare for class? This is conducted through a mixed methods design that draws on empirical data from interviews, mobile ethnography, surveys, and log data. The results highlight the wide range of resources students utilise, including digital and analogue tools, the various temporal patterns of preparation, and students' spectrum of feelings in their preparation. The findings suggest the importance of understanding individual students' preparation habits to facilitate targeted teaching approaches that cater to diverse learning needs. The article contributes to the existing literature on study habits and strategies, emphasising the need for educators to recognise and adapt to students' unique preparation behaviours in order to enhance their academic success.

Keywords: adaptive learning platform; study habits; student preparation; nursing education.

Introduction

As technological advancement continues to progress, the education sector consistently encounters emerging technologies that often hold a promise to improve efficiency and learning (Watters, 2023). However, the progression from new technology to enhanced learning is not linear. Research often suggests that technologies sometimes lead to unexpected and sometimes negative outcomes (Cuban, 2001; Selwyn, 2016). This is often due to a lack of understanding among educators, technologists, and management regarding the practices they aim to change. In response to this issue, design-based methodologies have gained prominence (Koskinen et al., 2011; McKenney and Reeves, 2018). These methodologies place significant importance on acquiring in-depth knowledge about the specific educational domain targeted for transformation, which should inform the design process. In other words, enhancement of learning with novel technologies stands and falls with the solvency of the knowledge acquired of the culture and individuals inhibiting the educational context one aims to change.

The purpose of this article is to present such detailed knowledge of relevance to future educational interventions that somehow target students' preparation. We do this by examining the diverse approaches to class preparation among students when a new technology is introduced. This diversity underscores the importance for teachers, technologists, and change managers to gain insight into students' preparation habits and their current readiness for a specific class. Understanding these factors is crucial for effectively addressing the educational needs of all students in the class. By grasping students' emotions, utilised resources, and preparation time, educators can differentiate and personalise learning experiences. This insight allows for tailored teaching that meets individual needs and capacities, thereby optimising engagement and success in educational journeys (Wiley et al., 2020; Wu et al., 2023).

This study focuses on a project in nursing education that had the intention of utilising a pedagogical framework of personalised and flipped learning. In this framework, students engage with an adaptive learning platform called Rhapsode™ to prepare for class, while classroom activities focus on skills and reflections related to the content presented on the platform.

The distribution of learning content to students was based on the students' interactions with the platform's learning content. The learning content comprised of text for reading, multiple-choice questions, fill-in-the-blank questions, ranking terms, anatomical figure identification, video resources explaining course content, and more. In interacting with the content, students give their response (for example, by choosing A or B in a multiple-choice test) and subsequently, students are prompted to indicate their confidence level regarding their responses to the learning content. Students can choose from options such as 'I know it', 'I think so', 'Not sure', and 'No idea' in conjunction with each response. The platform then provides a new learning content to the student based on both student response and stated confidence level. This type of adaptation applied is referred to as content-level adaptation (Yaghmaie and Bahreininejad, 2011).

One of the goals of the research project was to encourage educators to use data generated by students' interactions in Rhapsode to guide and plan personalised and flipped classroom teaching experiences (Nortvig, Jørnø and Andersen, 2022; Jørnø, Nortvig and Andersen, 2022). However, despite the project's intentions and the availability of some student data, we discovered that students were preparing for class in ways different from what educators had encouraged them to do and thus different from what the educators anticipated. Therefore, this article aims to address the following research questions (RQ):

(1) How do students feel about class preparation?
(2) What learning resources do students choose?
(3) When and where do students prepare for class?

The data for this study was collected as part of a research and development project conducted at University College Absalon. As the project expanded and more students were expected to use the platform for their preparation, it became apparent that the term 'preparation' encompassed various practices. This realisation prompted us to explore the research question discussed earlier.

The purpose of preparation is to enhance the process of students' learning. However, learning is a contested concept. We justify our three research questions with reference to research in learning that highlights its contextual, material, and emotional nature. Learning can be understood as a cognitive process primarily associated with knowledge acquisition.

However, contemporary research on learning emphasises the social, contextual (Lave and Wenger, 1991), and material aspects of learning (Sørensen, 2009; Fenwick, Edwards and Sawchuk, 2015; Hasse, 2020). Therefore, the types and variety of learning resources students engage with during preparation are also significant.

Research has emphasised the significance of students' emotions in relation to their learning outcomes (Pekrun and Stephens, 2012). In traditional classrooms, teachers often unconsciously consider students' emotions when making instructional decisions. Signs of boredom, resignation, or disengagement, such as yawning, empty stares, or laughter, can influence teachers' choices. Emotions can also be linked to the technologies and learning materials students use, with some emotions indicating constructive learning processes while others signify the opposite (Graesser, D'Mello and Strain, 2014). Therefore, our focus is to uncover the emotions and sentiments associated with preparation. We define sentiments and feelings as the students' emotional tone or attitude towards the act of preparing. In addition to text-based data, the use of emojis to gain insights into sentiments has gained popularity (Novak et al., 2015).

Related research

In the following paragraph, we will highlight existing literature of relevance to the three research questions of this article. A great majority of literature concerning study habits is conducted within the field of online and blended learning. We have excluded this in our review, as our empirical context concerns conventional education, where students are supposed to prepare asynchronously at home and meet physically at campus for class. Research on effective study strategies has a long history (Hattie, Biggs and Purdie, 1996; Fleming, 2002) and there is no universal study pattern that suits all students. However, there is limited research on how students actually study and prepare for class (Tomes, Wasylkiw and Mockler, 2011; Boevé et al., 2016; Fergus et al., 2021; Gurung et al., 2022; Blasiman, Dunlosky and Rawson et al., 2017), despite the crucial role of study habits in students' learning progress and academic success (Lorås et al., 2021).

Different terms, such as strategies, techniques, habits, and tactics, are often used interchangeably in the literature to describe students' study behaviour (Lorås et al., 2021). To clarify, Lorås et al. (2021) propose that study strategies refer to cognitive control over

study activities, while study habits are characterised by the consistency of study behaviours, regular use of strategies, and the study environment. Time management is often included in the study of habits (Lorås et al., 2021). In the following we briefly outline existing research related to our three research questions.

The variation of the applied technologies, strategies and techniques is seen in a study by Gurung et al. (2022). In this study, 249 psychology students used various study techniques which were examined in two courses, along with measurements of perseverance, metacognitive skills, distractions, and procrastination. The chosen study techniques varied greatly between the courses, but the most frequently used techniques were the high utility technique and practice testing. Perseverance and metacognitive skills showed correlations with many study techniques but did not predict exam scores (Gurung et al., 2022). In continuation hereof, we may also hypothesise that students used a variety of different technologies during preparation. This is echoed in a study by Caviglia et al. (2018), where they conclude that most of the resources students use are independent of the technologies provided by the educational institution.

In a survey study by Fergus et al. (2021) the temporal element of students' preparation process was examined by comparing undergraduate students in Spain and the UK. The study revealed differences in their study strategies and habits, particularly regarding the actual time of study and opinions on the most effective time for studying. Most students from Spain reported studying most in the evening (62.7%), while UK students studied predominantly in the evening (49.4%) and late at night (48.2%). Interestingly, Spanish students believed the evening was the most effective time for studying, while UK students believed the morning was most effective, despite only 24.1% studying during that time (Fergus et al., 2021).

The emotional aspects of study habits and performance have been shown to be correlated. Drawing on a psychological framework De la Fuente and Cardelle-Elawar measured different constructs. This led them to conclude that 'behaviors referring to action–emotion styles, study habits, and academic performance are inter-dependent' (2009, p.574). The psychological literature, however, is dominated by either quantitative experiments aimed at analysing correlations of traits and validating constructs (Kamtsios and Karagiannopoulou, 2020; Iqbal et al. 2022) or they examine particular emotions because they are related to pathological conditions such as anxiety or stress (for example,

Mahato and Adhikari, 2023). Little attention is paid to how students themselves describe their emotions and feeling associated with study preparation.

Lastly, a systematic review (Barranquero-Herbosa, Abajas-Bustillo and Ortego-Maté, 2022) on the effectiveness of flipped learning in nursing education, highlights the importance of coherence between pre-class and in-class activities. Pre-class activities, in this context, is similar to what we consider as preparation. Here, reading books, e-books, and watching videos are mentioned as the most widespread. Several studies provide guidelines for pre-class activities, but only a few empirically address what students actually do during preparation. Here, Njie-Carr et al. (2017) highlight that students prepare inadequately, leading to a sense of frustration. Another study emphasises that students often experience insufficient time to interact with the pre-class activities (Ward, Knowlton and Laney, 2018).

Understanding students' study habits is crucial for effective teaching, as students have their own unique habits, strategies, and cultural contexts that may be challenging to alter. Therefore, further research in this area is essential.

Methods

Context of the study

To address our research questions, we apply a mixed method (Creswell, 2003) study with our data coming from four different sources, two qualitative and two quantitative. Furthermore, our aim is not to generalise but rather explore through our findings. In this section we will present our methods for data collection, analysis, and the definition of learning applied in this study.

The data was analysed using a thematic approach over a year, spanning five semesters. We adopted Braun and Clarke's (2006) method, beginning with a thorough reading of the data for familiarity. Initial codes were generated and systematically applied, highlighting patterns. Potential themes emerged, which were then reviewed, refined, and mapped. Subsequently, these themes led to the three themes mirrored in the research questions of the article. Finally, clear definitions and names were assigned to each theme, linking them

to the research objectives. In the results section, we delve into specifics concerning the analytical processing of the data.

The integration of both qualitative and quantitative data allowed us to triangulate our findings (Shih,1998; Fielding, 2012) and strengthen the evidence supporting our research conclusions. As we will explore further, the quantitative data offered statistical evidence that complemented the patterns observed in the qualitative data, while the qualitative data provided contextual information and added depth to the quantitative findings. By combining data from interviews and mobile ethnography with the quantitative data, we adopted a more comprehensive and multifaceted approach to our research, enabling us to gain a deeper understanding of the phenomena under investigation.

There were two semesters of students involved in the study: third and fourth semester on University College Absalon's nursing education programme. Each semester had two classes designated as either a control or test group. The choice of whether a class served as a test or control group was optional, as was participation in any of the four study methods. Thus, voluntariness was the only inclusion criteria applied for this study (see Table 1 and Figure 1). Given that the purpose of the study is to explore rather than to generalise, we do not view this as an issue.

The control groups were given traditional class preparation consisting of physical and digital reading content, practice and reflection questions, educational videos etc. while the test group received fundamentally similar content, though fully digitalised and distributed on Rhapsode. The teachers associated with the test groups were able to see students' progress and difficulties with their class preparation content.

Students and teachers agreed to participate in the study willingly after being informed about its objectives and how their involvement would contribute to the research. Additionally, they were provided with details regarding the expected time commitment and were informed that they had the choice to withdraw their participation if they desired. If students retracted their participation they were provided with the conventional physical and digital preparation content.

In summary, we applied four methods which are summed up in the following Table 1, whereas the methods' student participation is summed up in Figure 1.

Table 1. Overview of applied methods.

Method	Content/variables	Analysis	Number of participants
Group interviews	Preparation habits and preferences regarding preparation	Inductive coding	50 students
Mobile ethnography	Habits and emotions associated with preparation	Inductive coding	17 students
Logfiles	Time labels and activity labels.	Descriptive analysis and visualization of data in diagrams and plots	26 logfiles (3rd semester 12; 4th semester 14)
Survey	Questions on whether students prepare for lectures	Descriptive analysis of proportions	340 responses (n=59 students) (3rd semester 123 n=36 students;; 4th semester 217 responses n=23 students)

Figure 1. Flow diagram of the number (#) of students in each method from Table 1.

Semester	# students in semesters	Groups	# students in groups	# students in survey	# students in group interview	# students in log files	# students in mobile ethnography
3	52	C	27	14	50	12	17
		T	25	22			
4	59	C	28	11		14	
		T	31	12			

The project was segmented into five distinct work packages, two of which focused on quantitative and qualitative research and evaluation. Area9, the product owner of Rhapsode, managed a separate package dedicated to content development. Despite our collaborative efforts, we, as researchers, maintain no association with the company, and similarly, they exert no influence on our findings.

In conclusion, our study adopted a mixed-method approach, focusing on exploration over generalisation, and drawing on diverse data sources for a comprehensive analysis. Through ethical engagement of voluntary participants in distinct test and control groups, we ensured a robust, in-depth exploration. The integration of multiple research methods fortified our findings, providing nuanced insights into educational practices.

Group interviews

The first source comprises eight short interviews conducted with 50 students across two semesters. These interviews aimed at gathering information about the students' preparation for classroom teaching, including their typical or preferred preparation routines and their utilisation of learning resources, with a specific focus on the digital learning resource, Rhapsode. The students were provided with printed questions and asked to discuss and record their answers using a Dictaphone. This approach had both strengths and weaknesses. Firstly, it enabled us to collect recordings from numerous students in a brief period. Secondly, the one-to-one interview setting tends to create an asymmetrical power hierarchy, potentially causing students to avoid speaking openly about their preparation if associated with embarrassment or taboo (Kvale and Brinkmann, 2009). The absence of an interviewer made it possible to avoid this scenario. A drawback was that some interviews became highly structured, with respondents providing terse answers to all questions, and no follow-up inquiries being made. In contrast, other groups conducted unstructured interviews, where a single question could lead to open dialogue. The strengths of group interviews lie precisely in exploring a group's attitudes and the co-creation of shared meaning (Gibbs, 2012), so we see no crucial drawback in groups having open discussions. A researcher was physically nearby the groups and came to all groups to ensure that they had answered all questions before we turned off the Dictaphone.

Mobile ethnography

The second qualitative data source we utilised is mobile ethnography. To effectively investigate the research questions, we needed methods that could offer continuous insights into students' preparation. This includes understanding their actions, the underlying motives behind those actions, and their subsequent reactions, which mobile ethnography provides us with.

Ethnographic methodology primarily focuses on gaining insights into actions, motives, and reactions (Gulløv and Højlund, 2003). However, preparing for teaching is a complex phenomenon that occurs over an extended period, in various locations (such as at home or on campus), at different times (afternoon or night), and involves back-and-forth activities. Consequently, it becomes challenging and resource-intensive to study the preparation phenomenon by using traditional ethnographic methods like participant observation.

Mobile ethnography, on the other hand, leverages mobile devices to collect real-time data on participants' behaviours and experiences in naturalistic settings, often using multimedia formats. This approach allows for extended periods of data collection, offering a profound understanding of participants' habits and reasoning (Muskat, Muskat and Zehrer, 2018). In our study, 58 students were enrolled in a two-week research project where they received small assignments and questions related to their preparation habits via instant messaging twice a week. Out of these students, 33 participated, with 17 completing all of the assignments.

Quantitative methods

The first quantitative source consisted of a survey designed to assess students' perceptions of their preparation. Students were asked to complete the survey before the beginning of class, and a total of 340 student responses (n=59 students) were received after each lecture (third semester, five lectures; fourth semester, seven lectures). The survey comprised four questions, but for the purpose of this analysis, we will focus on one specific question: 'I feel prepared for the lecture today based on my preparation'. Students were provided with a 5-point Likert scale to indicate their response, ranging from 'highly agree' to 'highly disagree'. Additionally, there was an option to select 'I did not use Rhapsode for this lecture' since the use of Rhapsode was not mandatory.

The second quantitative source consisted of log data and learning analytics obtained from students' interactions with Rhapsode. For our analysis, we will utilise the time labels of activities, activity ID, and progression scores.

The participants for the quantitative sources were selected through an experimental design. Two groups of nursing students from the university college were involved,

including two Control groups (3C: n=27 & 4C: n=28) and two Test groups (3T: n=25 & 4T: n=31).

Results

The following sections are structured according to the presented chronology of the research questions. In the subsequent sections, we will identify and define key empirical parameters of student preparation that emerged from our study. Each point shares a common characteristic, namely, the presence of extensive variation within each parameter. To illustrate this variation, we will provide specific examples from our dataset.

How do students feel about class preparation?

Investigating RQ1, we deployed mobile ethnographic and survey data.
Drawing inspiration from sentiment analysis of emojis in big data analysis, we experimentally requested the 58 students participating in our mobile ethnography to respond to our questions using emojis. The aim was to explore the range of emotions associated with preparation.

One of our questions was: 'Reply to this message with three emojis that reflect your experience of your last preparation session'. Out of the 17 students who responded, we received a total of 60 emojis, with 27 clearly expressing a sentiment, predominantly regular facial smileys.

With inspiration from Novak et al. (2015), we cross-referenced these smileys with emojipedia.com, a dictionary that provides names, common usage scenarios, and explanations of the emotions conveyed by emojis. We categorised these emotions into positive and negative lists based on their immediate connotations. It is important to note that this list does not offer a fixed interpretation of whether a particular emotion is inherently positive or negative, but rather provides an overview of the range and intensity of the feelings associated with preparation.

Table 2. Overview of identified emotions related to student preparation.

Positive	Negative
• Happiness • Relief • Amusement • Amazement • Fascination • Impression • Excitement • Gratitude • Warmth • Positivity • Joy • Goofiness • Fun • Satisfaction • Bliss • Pride • Irony • Awe • Reflection • Earnestness • Playfulness	• Self-deprecation • Anger • Frustration • Rage • Boredom • Sleepiness • Disappointment • Displeasure • Embarrassment • Shame • Wackiness • Discomfort • Exhaustion • Sadness • Pain • Grief • Resentment • Shock • Disbelief • Skepticism • Overwhelm • Nervousness • Awkwardness • Puzzlement • Mockery • Suspicion • Concern

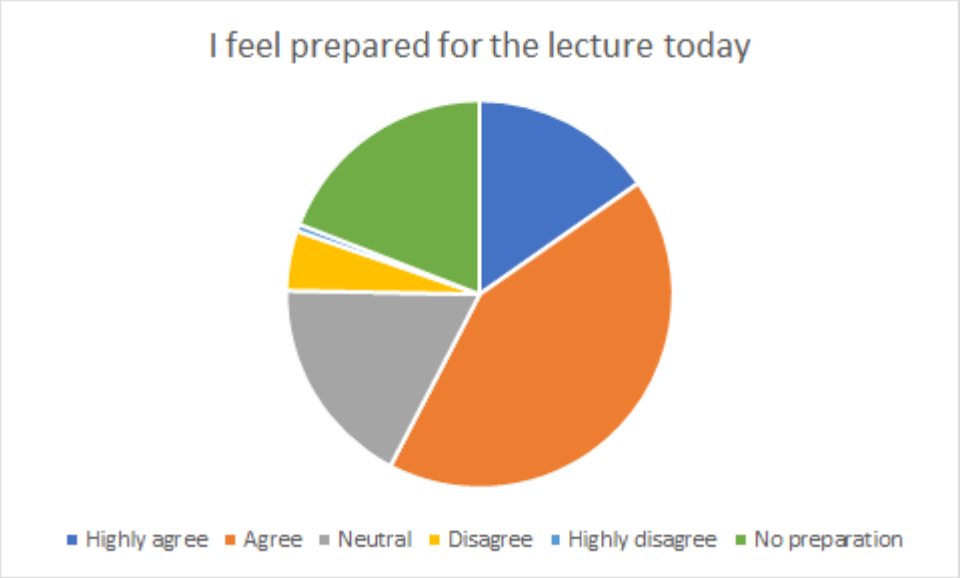
The list should be interpreted with cautiousness. Firstly, it is a gross list of possible emotions associated with the emojis from students. Secondly, some emojis are equivocal (such as a loudly crying face: 😂), and the intention of the sender is uncertain. In such

cases, we included both grief, pride, and joy as they are mentioned as possible meanings on emojipedia.com. That being said, the list clearly demonstrates that the act of preparation evokes a wide range of emotions, including amusement, bliss, boredom, rage, and resentment. It also reveals the presence of numerous distinct emotions. This leads us to the conclusion that preparation is an emotional process that can elicit various feelings. This is significant because students' emotions have been shown to influence their learning outcomes (Pekrun and Stephens, 2012).

In addition to the diverse range of emotions, students also exhibit varying levels of satisfaction with their own degree and extent of preparation. Here, satisfaction refers to how content students feel about their level of preparation. It not only pertains to the intensity of their preparation but also encompasses their personal satisfaction. This is connected to self-efficacy, which has a significant impact on learning (Bandura, 1997). Higher satisfaction is likely to correlate with greater self-efficacy.

In our survey, conducted with the control and test groups of third and fourth semesters, we asked students to respond to: 'I feel prepared for the lecture today based on what I have learned from Rhapsode'. Although the question specifically mentions Rhapsode as a resource, we consider the collected data relevant for investigating whether the variety of emotions – some of which are quite negative – also affects students' perception of being well-prepared for class.

Figure 2. Pie chart on student responses to question 2 from the survey 'I feel prepared for the lecture today from what I have learned from my preparation for today'.



340 student responses from 59 students responding before each of their lectures.

Among the 340 student responses, more than half (58%) expressed a high agreement or agreement that they felt prepared for class. The majority of the remaining responses were either neutral or indicated a lack of preparation (37%). This leads us to the conclusion that despite experiencing a wide range of emotions during preparation, the majority of students end up feeling fairly well prepared. To further investigate this hypothesis, we included a task in mobile ethnography that asked students to use a number between 1 and 10 to describe their satisfaction with their own preparation for the last class. A complete range of numbers from 1 to 10 was used by students, indicating a significant variation in satisfaction levels. The explanations provided for the chosen numbers revealed that satisfaction was influenced by various aspects of preparation, such as the degree of completion, the difficulty of the content, accessibility of resources, the usefulness of knowledge in practice, and the ability to remember. In conclusion, despite experiencing a range of emotions, including negative ones, students generally exhibit a relatively high level of satisfaction with their own preparation. The sources of satisfaction may vary among students, with one student being satisfied due to completing all the tasks while another student may be satisfied because the completed portion felt useful.

What learning resources do students choose?

In addressing RQ2, we utilise data from the group interviews and mobile ethnographic data. From these data, we observe that students actively and independently experiment with, evaluate, use, and combine these resources. Their choices are influenced not only by educators' recommendations but also by their prior experiences and personal learning preferences. While some students adhere to their educators' recommended learning resources, such as Rhapsode in this case, and solely rely on this digital technology for accessing learning content, others find this specific technology too demanding or time-consuming. As a result, they resort to reading books instead or adopt a hybrid approach by combining both types of resources. In a group interview, a student shared, 'Reading on the screen gives me a headache, so I read the book and test myself afterwards in Rhapsode'. Many students employ a similar strategy.

Some students express a preference for watching videos that present the learning material in a multimodal format, which they find easier to understand. Generally, students choose their learning resources and combinations based on the ease of comprehension, retention, and time efficiency of the content.

During the interviews, the majority of students take notes while preparing for class, either by hand or on a computer. They believe that the act of writing helps them remember the content more effectively, and it allows them to easily locate important material when needed, such as during exam preparation. However, only a small number of students adhered to the expected preparation method outlined by the educators and the pedagogical framework, which involved reading the text in Rhapsode, answering the questions promptly, and attending class consistently.

Using mobile ethnography, we instructed the students to specify the tools and resources they utilise, emphasising specificity, such as 'I use Google Docs, pen and paper, and physical books'. We received responses from 17 students, and the data from this source revealed a significant variety in terms of their preference for digital or analogue tools, as well as their usage for consumption or production purposes. Notably, analogue tools emerged as the dominant choice for both resource consumption and production during the preparation phase.

Table 3. Variety in resources used by students (n=17) in preparation. Parentheses are numbers of students reporting a particular resource.

	Analogue tools	**Digital tools**
Consumption (e.g. reading, watching, listening)	Books (8),	StudyBox (3), Rhapsode (3), YouTube (2)
Production (e.g. notetaking)	Highlight pen (5), notebook (3), pen (6), post-its (1)	Google Docs (1), OneNote (6), Word (1),

Adding to the complexity of preparation, we find that there is no clear-cut combination of resources that characterises the students. Instead, they exhibit a preference for and utilise a wide range of resources. Additionally, they may develop or possess their own individual strategies when it comes to resource usage.

When and where do students prepare for class?

Addressing the RQ3 we used both group interviews, log data and learning analytics, and mobile ethnographic data. The students' way of describing their preparation routines reveals a significant parameter related to timing: when do students prepare? In our qualitative data, we identify four main groups and smaller subgroups that represent various combinations: preparation before class, after class, preparation limited to the final exam period, or no preparation at all.

The first (small) group of students adheres to the preparation routine expected by most educators, which involves reading texts in Rhapsode and answering quizzes. However, their reasons for choosing this strategy are scarce, and if they don't prepare before class, it is usually due to time constraints.

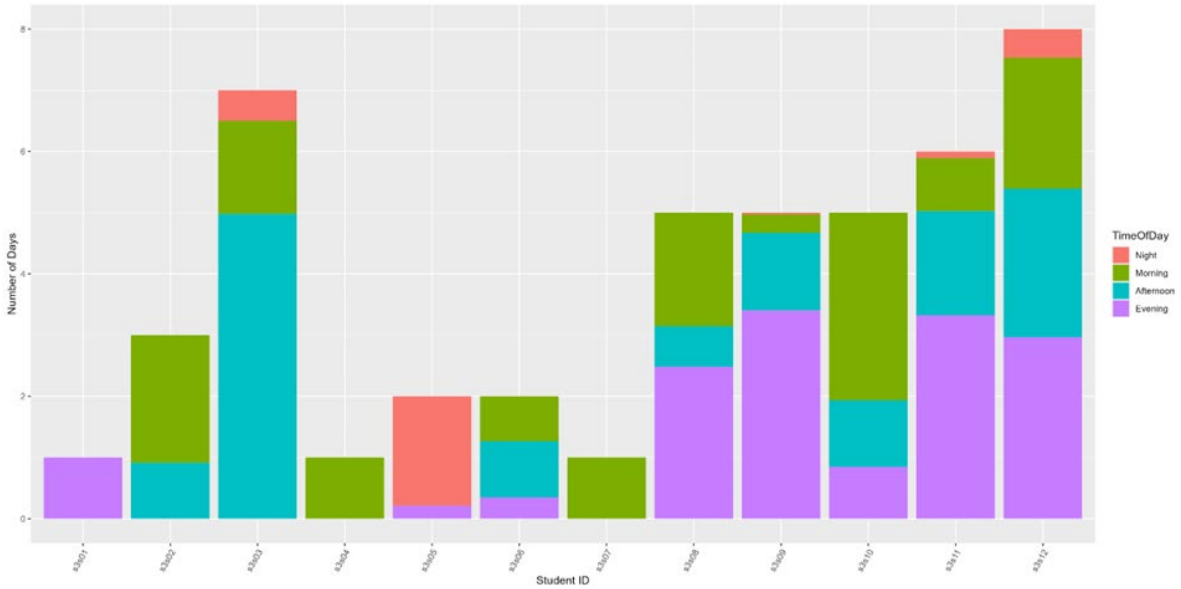
Some students come to class unprepared, relying on paying close attention and taking notes during lectures. They believe that if they miss anything, they can review the content later by reading their books or using Rhapsode. This approach has proven effective for them. On the other hand, some students only prepare shortly before exams to ensure they remember the information when they need to use and demonstrate their knowledge.

During the interview, one student explains that based on their experiences in nurse education so far, there is no need to prepare in advance because the educators provide important information during class. Many students also expect the educators to lecture and present the content in this manner.

Examining the log files of the student groups to determine how much and when they prepare on Rhapsode, resulted in a visualisation such as in Figure 3, which depicts students' preparation. With Figure 3 we attempted to identify patterns among the 12 students in the third semester. Six students spent three or fewer days preparing, three students devoted more than five days to preparation, while another three students spent exactly five days, primarily preparing in the evening.

The analysis indicates a considerable variation in when and how much students prepare for lectures in Rhapsode, with no discernible patterns between or across groupings.

Figure 3: Number of days where students did some preparation and the timeslot of when students in third semester prepared.



Each bar represents a student, the height of the bar is the number of days on which there was preparation activity on Rhapsode, and the color shows the proportion of activity taking place at each time of day (Number of events for that Time of Day for that student divided by Total number of events for that student). Time of day has been separated as, Night = 00.00–6.00 (orange), Morning = 6.00–12.00 (green), Afternoon = 12.00–18.00 (blue), Evening = 18.00–00.00 (purple).

By analysing Table 4 and Figure 3, we can examine the variations in the extent of students' preparation. In the case of the 14 students from the fourth semester, they interacted with a total of 30 unique e-chapters in Rhapsode. Among these, 11 e-chapters were attempted by 10 or more students, 11 e-chapters were accessed by three to five students, and 8 e-chapters were only accessed by one to two students. Out of the cumulative 190 e-chapters, 178 e-chapters were fully completed (reaching 100% progression) by one or more students, 8 e-chapters were partially completed (reaching between 51-99%) by one or more students, and four e-chapters were less than 50% completed by any student.

Based on the assessment of Table 4 and Figure 3, we can roughly categorise students into three types based on when they stopped preparing in Rhapsode:

- Type A consists of students who gave up after completing one-two e-chapters (students s4s01, s4s02, s4s04, and s4s05).
- Type B includes students who discontinued their preparation after completing three-five e-chapters (students s4s07 and s4s09).
- Type C, as they persisted and completed the entire set of e-chapters.

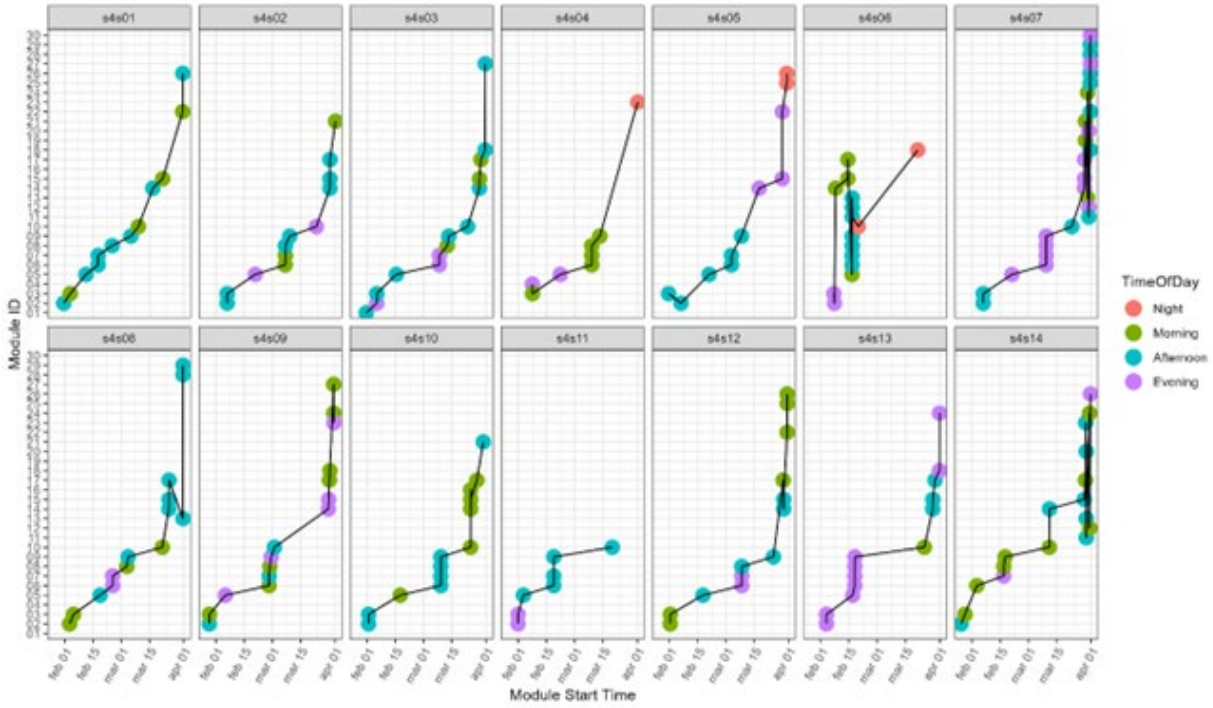
Table 4. Overview of e-chapters for fourth semester test group (4T).

Student no.	Total e-chapters	Core e-chapters
s4s07	26	11
s4s14	17	10
s4s06	15	11
s4s09	15	11
s4s03	14	11
s4s08	14	11
s4s10	13	11
s4s12	13	10
s4s13	13	11
s4s01	12	10
s4s02	12	11

s4s05	11	8
s4s04	8	6
s4s11	7	7

Total e-chapters are the total amount of e-chapters completed by each student whereas Core e-chapters are the amount of core e-chapters completed by each student.

Figure 4. The spread of fourth semester students' preparation.



Days are presented on the x-axis and the courses are given on the y-axis. Colours describe when the module was completed: Night = 00.00–6.00 (orange), Morning = 6.00–12.00 (green), Afternoon = 12.00–18.00 (blue), Evening = 18.00–00.00 (purple).

To conclude our findings from Figure 3, 4 and Table 4 we see a large variation in the process of preparing but without any patterns across students.

Recognising the complexity of context, we narrow down its definition to the physical location aspect in this article (Gulløv and Højlund, 2003). Specifically, we focus on the question of 'where do students position themselves during their preparation?' as a crucial aspect of context, considering that the physical environment can influence learning outcomes (Schilhab and Kuzmicova, 2020).

During our mobile ethnography, we instructed the students to 'describe the resources they utilise during preparation and their preferred preparation location'. Once again, the responses revealed a wide range of physical contexts for preparation. Differences exist at various levels, such as whether students prefer the comfort of their home in a private setting or if they prefer an external location. Moreover, even within each category, further distinctions can be observed.

Table 5. Overview of preparation locations.

Home	Outside home
- In the couch in my living room - By my dinner table - In my kitchen - By the coffee table with television in the background - By the desktop - In my bed	- At the local library - Common area in the hall of residence - In the bus - At the parking lot in my car

Although the list is not comprehensive, it provides sufficient detail to emphasise the diverse nature of the context in terms of physical location for preparation. Understanding the significance of context is essential for designing effective preparation strategies.

Conclusion and limitations

This study uncovers that student preparation is a complex and multifaceted phenomenon. In educational contexts, preparation typically involves uploading resources to a learning management system and setting a due date. However, what happens beyond this point remains mysterious. As shown in the review, there are studies that point to the fact that preparation is a multifaceted practice. Within flipped learning, systematic thought is given to the relation between pre- and in-class activities. However, the empirical analysis of students' actual study behaviour is limited, and the small amount of evidence available suggests that it can also be linked to time-related and emotional challenges. We have added in-depth empirical knowledge to this.

There are limitations to consider. Firstly, the data was collected within the context of nursing education in Denmark, necessitating further research for generalisability. Secondly, the use of Rhapsode for evaluating and generalising student activity was limited due to low student participation from both experimental groups. Only 28.6% of third-semester students (n=12) and 28% of fourth-semester students (n=14) chose to use Rhapsode, possibly due to perceived usability issues (Khalid, Tretow-Fish and Roark, 2023). This hinders generalisation of our data. Furthermore, survey responses indicated a lack of student preparation, with 20.5% of third-semester students and 3.4% of fourth-semester students reporting non-preparation. The response rate for the third and fourth semesters was not extensive (58.6% and 62% respectively), resulting in no responses from approximately 17 students in the third semester and 19 students in the fourth semester, a significant portion of our sample size. However, this article contributes to the existing research in study habits by presenting detailed knowledge about the diverse approaches and feelings to class preparation amongst students in a Danish nursing education.

Our research demonstrates that preparation goes beyond mere adequacy: it encompasses qualitative distinctions. Students' preparation varies based on the types of resources they use, ranging from traditional analogue tools to digital technologies. Additionally, preparation exhibits diverse temporal and spatial dimensions. Some students engage in prolonged and intensive sessions, while others divide their preparation into smaller segments. Timing also varies, with students preparing well in advance, right before class, or even after class. Preparatory behaviours may also differ at different stages of the semester, with some students prioritising early preparation and others focusing on later periods. Importantly, our findings indicate that student preparation elicits a wide range of emotions, although most students express satisfaction. However, it is worth noting that this sense of satisfaction may stem from different underlying factors.

From a design perspective, the knowledge presented here may inform design principles for educators. Two concrete yet speculative proposals for new practices utilising this knowledge could be: 1) fostering a more open classroom dialogue about the nature of students' preparation, encompassing discussions on their achieved tasks, emotional experiences during study, and their specific approaches to preparation; and 2) a more integrated use of learning analytics to gain insights into variations and patterns in students' study habits, thereby identifying individual and collective needs and adjusting instructional

strategies accordingly. These initiatives could contribute to a more adaptive and responsive educational environment, promoting greater student engagement and more effective learning outcomes.

This study also opens the door to new questions worth exploring. First, how can teachers use what they know about study habits to shape their teaching methods? Second, with so many different emotions in play, are some more helpful for learning than others? Also, when teachers give out study materials, should they be thinking about the kind of emotional response they want to inspire? These questions highlight the importance of understanding how feelings interact with learning and suggest exciting directions for future research and classroom practice.

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Author details

Tobias Tretow-Fish is a Ph.D. Student at the Technical University of Denmark. In his research he focuses on adaptive learning technologies and learning analytics. He is simultaneously affiliated with the 'Digital Learning Resources and Didactic Design' environment at University College Absalon where he is associated with the teachers' education.

Bjarke Lindsø Andersen specialises in Science and Technology Studies with a focus on digital tech, learning, education, and technology comprehension. He is affiliated with the 'Digital Learning Resources and Didactic Design' environment at University College Absalon where he is associated with the teachers' education.

Thilde Emilie Møller specialises in technology comprehension and the integration of technology in teacher education and digital learning environments. She is also affiliated with the 'Digital Learning Resources and Didactic Design' environment at University College Absalon where she is associated with the teachers' education.

Anne-Mette Nortvig explores IT's impact on learning, emphasising technology's role in teaching and meaningful experiences. She is affiliated with the 'Digital Learning Resources and Didactic Design' environment at University College Absalon where she is associated with the teachers' education.

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