CiC NEXTBOOK

Co-created Interactive Courseware

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Case study report - KU Leuven: Flipped Teaching in Uncertainty in Artificial Intelligence, 2022-2023

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The course material of this case study report is available here:
https://nextbook.io/book/uncertainty-in-ai

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1. Context

This case study is a repetition of the case study “KU Leuven 2021 Uncertainty in Artificial Intelligence”, in the academic year 2022-2023. Therefore the context is a copy from that case study report.

This case study focuses on the application of Nextbook in the context of blended learning in the 4 ECTS course Uncertainty in Artificial Intelligence, offered in the Advanced Master program of Artificial Intelligence at KU Leuven, Belgium. KU Leuven is a highly ranked research-intensive university both regarding research and education. The master of Artificial Intelligence is a multi-disciplinary one-year master that recruits many international students. The course Uncertainty in Artificial Intelligence is a mandatory course for students in the Engineering and computer science option (ECS) option, and a voluntary course for other students in the same program. Moreover the course is also offered as a voluntary course in other master programs at KU Leuven.

Typically, the course of Uncertainty in Artificial Intelligence has around 200 students, and a high success rate of around 85%. Students entering the course have diverse backgrounds, with different levels of experience and skills in mathematics, probability calculus, and programming. The case study focuses on how the co-creation software of nextbook supported the transition to a new hybrid pedagogical approach based on flipped tracking.

2. Challenge

As this case study is a repetition of the case study “KU Leuven 2021 Uncertainty in Artificial Intelligence”, in the academic year 2022-2023, the main challenges still hold, but this case study is more related to see if the results could be sustained.

A short summary of the challenges:

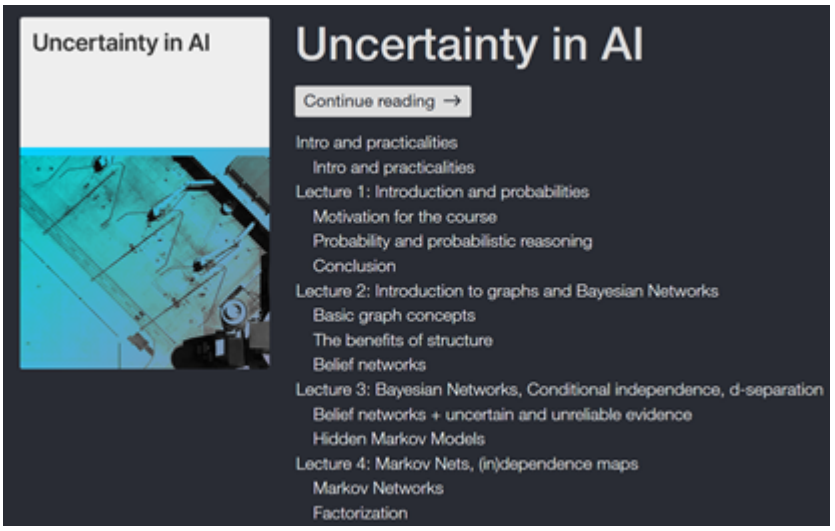
- offer a good online and flexible learning experience in a flipped teaching context
- offer an engaging learning environment that provides incentives for students to prepare for the weekly on campus sessions
- offer a learning environment with social collaboration possibilities
- provide the teachers with support when preparing for the on campus sessions (overview of questions and discussion),
- provide teachers with feedback on what parts students struggle with and where the course material could be improved.

3. Co-creation solution

This year, the Nextbook platform was used in the same way as last year.

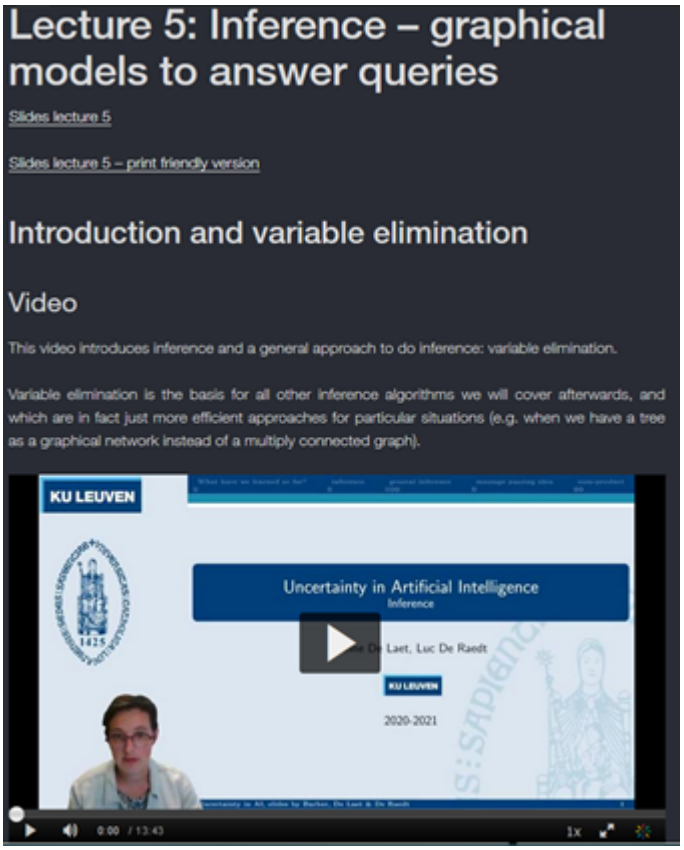
- The course material consists of 11 lectures.
- Each lecture consists of a set of videos and slides.
- Students can ask questions and discuss the course material directly on the lecture slides itself.

The screenshots below show the implementation of the course on nextbook.



Part of the outline of the online course material of Uncertainty in AI as available on the Nextbook platform

Slides as used in the video, with the opportunity to discuss/ask questions.



A video as made available in Nextbook

The situation of the co-creation solution within the framework of (Bovill, 2019) is shown in the Table below.

Question	**Possible responses**							
Who initiates the co-creation?	Staff-led	Student-lead	Staff and students					Other (elaborate)
What is the focus of the co-creation? (see Bovill & Woolmer, 2018; Healey et al., 2014)	Entire curriculum (co-creation *of* the curriculum)	Learning & teaching (co-creation *in* the curriculum)	Educational research & evaluation	Disciplinary research	Wider student experience			Other (elaborate)
What is the context for the co-creation? (see Bovill & Woolmer, 2018; MercerMapstone et al., 2017)	Curricular	Extra-curricular	University-wide					Other (elaborate)
How many students are involved? (see Mercer-Mapstone et al., 2017	1-5 (specify specific number)	6-10 (specify specific number)	11-20 (specify specific number)	21-30 (specify specific number)	31-100 (specify specific number)	101-500(250)	>500 (615)	Other (elaborate)

Have you selected students from a larger group or are you involving a whole class? (See Bovill, 2019; Bryson et al., 2015)	Selected	Whole class/group						Other (elaborate)
Which students are involved? (See Bovill, 2014)	Retrospective	Current	Aspiring/Future					Other (elaborate)
What year of study are the students in?	First -year of Bachelor	Bachelor later than 1st year	Master	Master after Master	PhD	Postgraduate	Lifelong-learning	Other (elaborate)
What is the scale of the co-creation?	1 class/interaction moment	several classes / interaction moments	1 project	several projects	Entire course	Faculty/school-wide	Institution-wide	Other (elaborate)
How long does the co-creation last?	Days	Months	Years					
What is the role of the student? (See	Representative	Consultant	Co-researcher	Pedagogical co-designer	Participant			Other (elaborate)

Bovill et al., 2016)								
What is the nature of student involvement? (See Bovill, 2017; Könings et al., 2017)	Informed	Consulted	Co-researcher	Pedagogical co-designer	Contributor			Other (elaborate)
What is the nature of reward or recompense given to students?	Payment in money	Payment in vouchers	Course credit	Refreshments	No payment or reward			Other (elaborate)
What is the goal of the co-creation?	To improve the course	To enhance student engagement	Aiming for a socially just higher education	To get the benefits of co-creation in the course	Incorporating the student perspective	To enhance student's skills		Other (elaborate)
….								

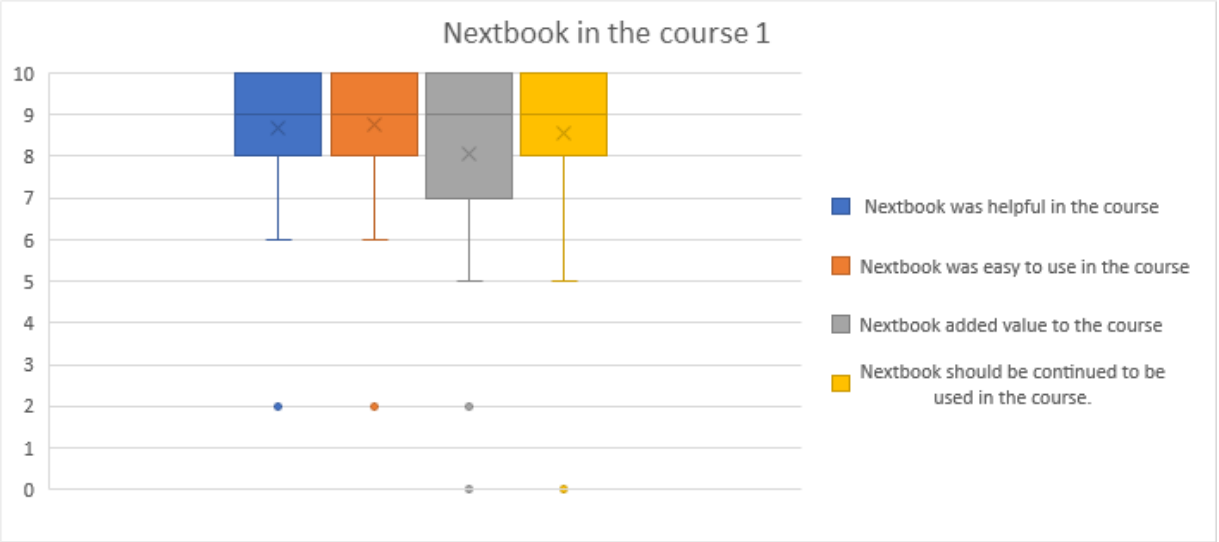
4. Results

171 students were registered for the course in the academic year 2022-2023.

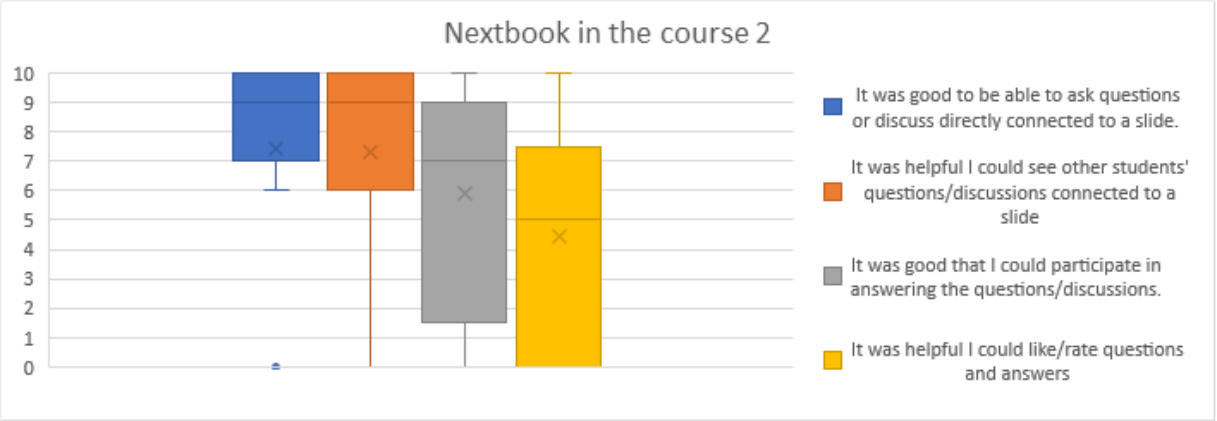
Experiences were collected from the students in using an online dedicated survey that was administered at the end of the semester. The survey was sent to all students in the course. The survey contains questions targeting the use of Nextbook in the course and potential future use and improvements of Nextbook (see supplemental material).

Student survey

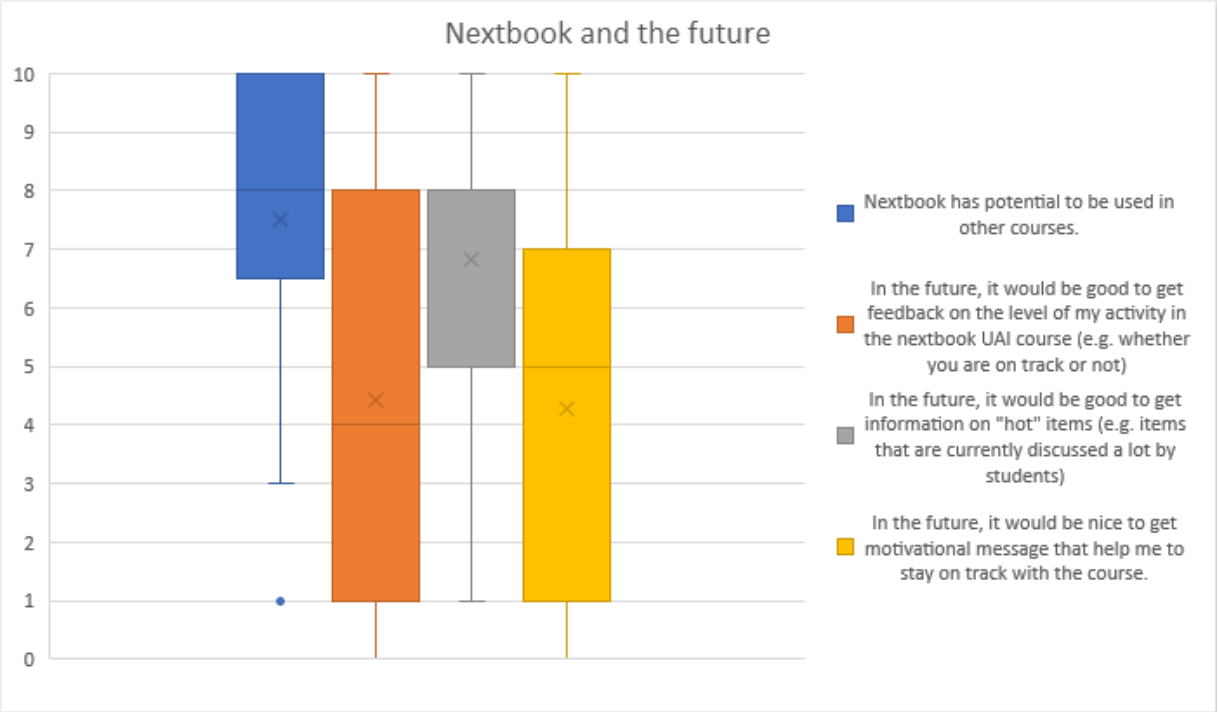
41 students replied to the custom online student survey (N=41). The results are presented in the figures and tables below.



Results of custom online student survey (N=41) – part 1.



Results of custom online student survey (N=41) – part 2.



Results of custom online student survey (N=41) – part 3.

Question [scale 0 (do not agree at all) -10 (agree fully)]	Mean	Std	N	DELTA last year
Nextbook was helpful in the course	8.68	1.6	41	0.99
Nextbook was easy to use in the course	8.76	1.62	41	0.79
Nextbook added value to the course	8.25	1.84	40	1.16
Nextbook should be continued to be used in the course.	8.75	1.44	40	1.21
It was helpful I could see other students' questions/discussions connected to a slide	8.82	1.71	34	0.57
It was good to be able to ask questions or discuss directly connected to a slide.	8.97	1.15	34	0.87
It was good that I could participate in answering the questions/discussions.	7.81	2.01	31	0.69
I was helpful if I could like/rate questions and answers	6.74	2.44	27	0.79
Nextbook has potential to be used in other courses.	8.56	1.93	39	0.97
In the future, it would be nice to get motivational messages that help me to stay on track with the course.	5.54	2.78	37	0.66
In the future, it would be good to get information on "hot" items (e.g. items that are currently discussed a lot by students)	7.68	2.47	38	0.77
In the future, it would be good to get feedback on the level of my activity in the nextbook UAI course (e.g. whether you are on track or	5.84	2.69	37	0.97

not)				

The above Table shows that students were more positive about Nextbook and the future possibilities on every single questions (DELTA last year = mean response this year - mean response last year). This shows that the continuous effort to not only improve the course material but also nextbook has caused increased satisfaction with students. Moreover, it shows that appreciation of students was not just because of the platform being new and fresh. This is therefore an indication that the effects can be durable.

The open comments of the students are used in the discussion and recommendations below.

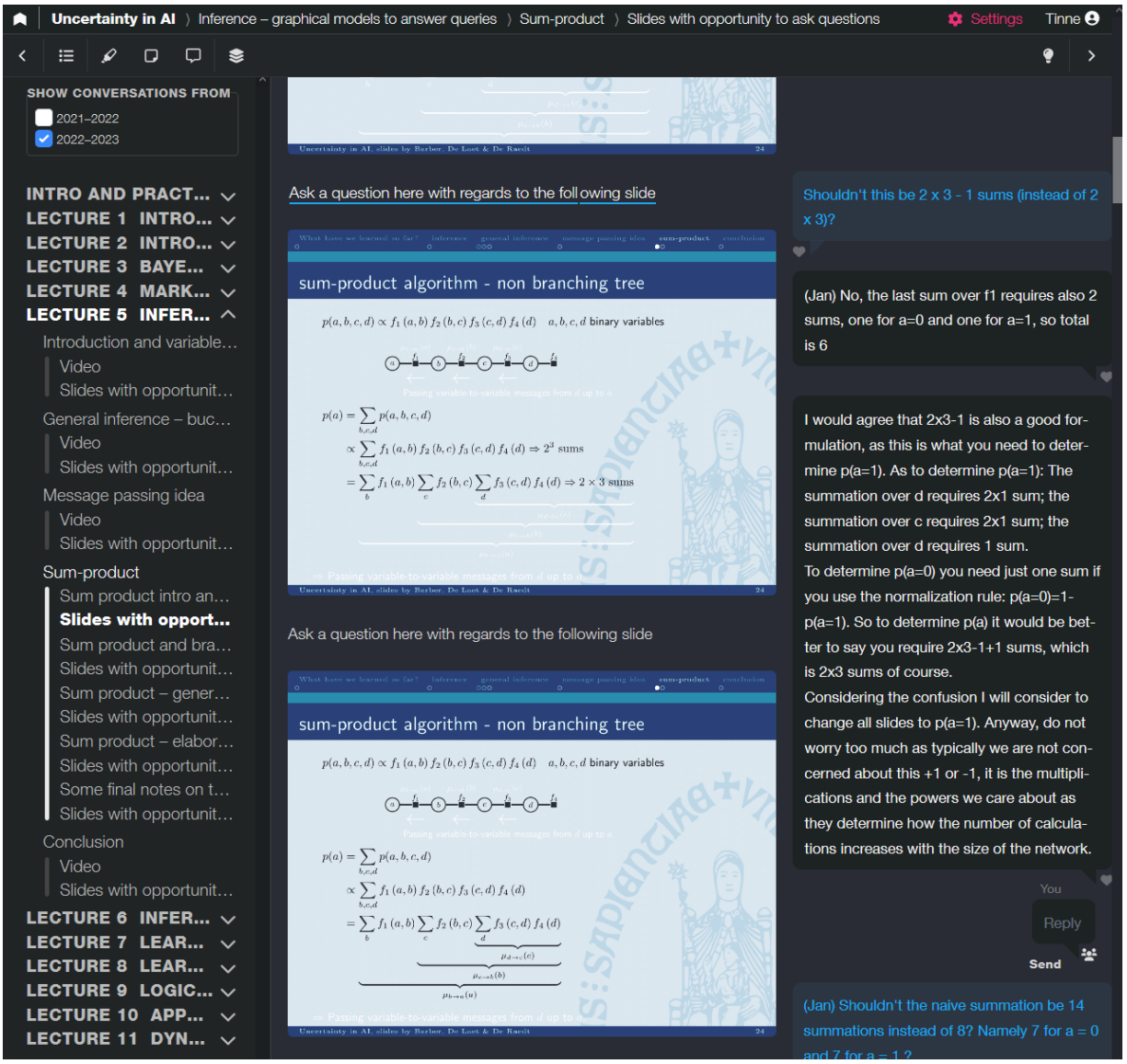
5. Discussion

This discussion digs deeper on the themes that were identified during the previous case study: the teachers' and course builders' experience (both regarding building the material on Nextbook, maintaining the material on Nextbook), the structured integration of material, connecting discussion to the course material, and the future of Nextbook.

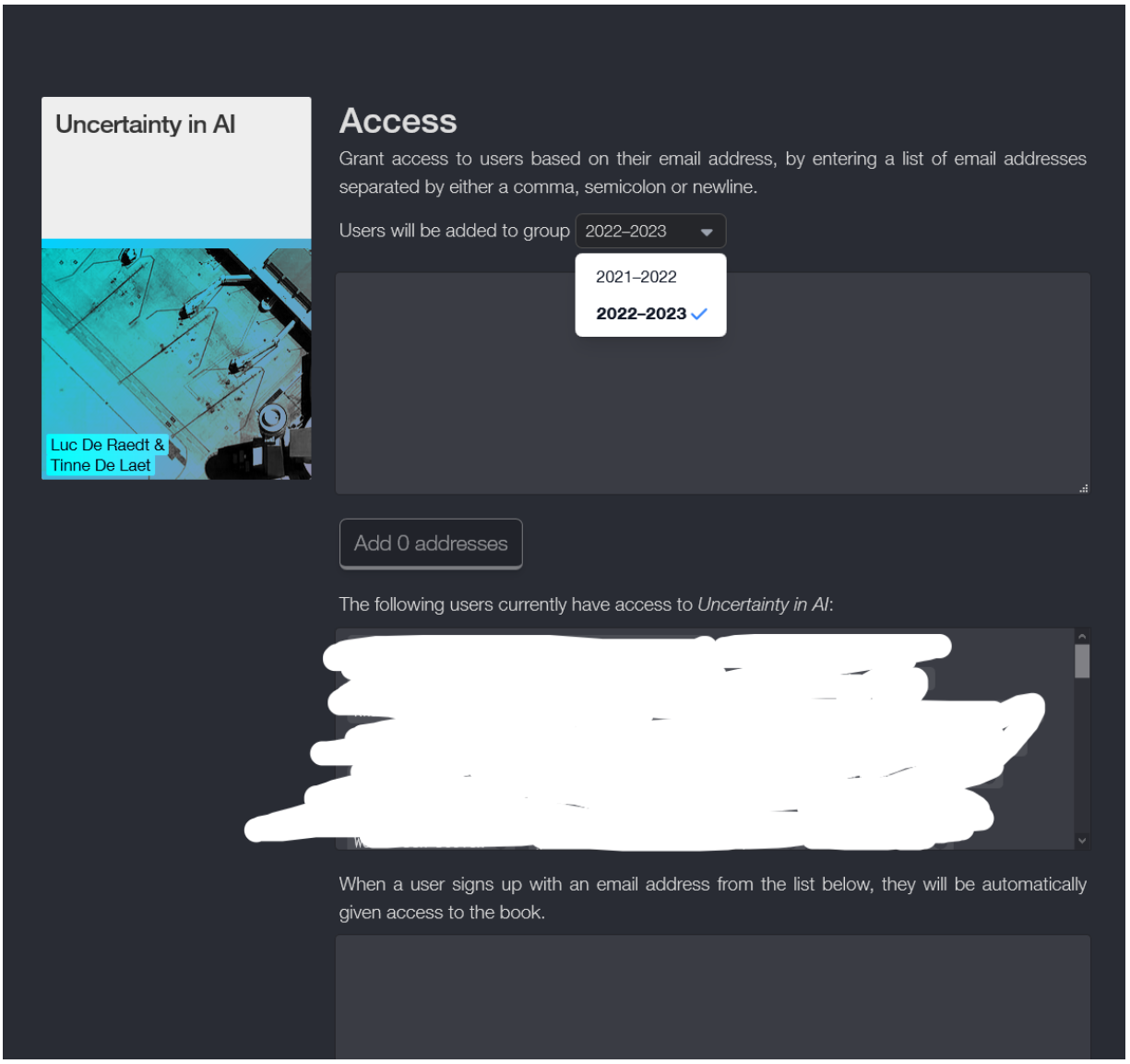
Teachers' and course builders' experience

Compared to the previous academic year, the focus was shifted from creating the course material to updating and maintaining the course material.

Nextbook offers functionalities for "cohorts" connected to the online textbook. Therefore, the new cohort of students in the new academic year could easily be added to the handbook. To the students it seems as if they are entering a brand-new textbook as the comments and discussions of the students of previous cohorts are not available to them. As a teacher and course builder it is easy to switch between the different cohorts. Furthermore, an intuitive interface allows to provide students access to particular cohorts.



Nextbook's for the online course material, allowing (menu in the top left corner) the teachers and course builders to easily switch between the different cohorts.



Nextbook's interface for adding new students to a particular cohort

Unfortunately, there is still no editing functionalities available in the Nextbook platform. Therefore, the course builder either has to edit the source material (word) and upload a new textbook (on a trial-and-error basis), or get in touch with the Nextbook itself for making changes. This procedure is not user-friendly and too cumbersome. Therefore, Nextbook should invest in the editing functionality in order to support better maintenance and updating of course material.

As a course builder, the comments and questions of students in the previous run of the course are very supportive to notice which parts of the course material could or should be further improved.

Structured integration of material

As last year, students most often commented on the good **structure** and **integration of material** on the Nextbook platform. Some comments: "It makes it easy to access all the course information.", "The separation between important specific topics. The fragmentation is also a bit easier to integrate rather than long continuous video.", "It allows us to study the contents at our

own pace, while keeping it structured and giving us an easy overview.", "It provided a nice breakdown of the course material into small sections. The integration of short video explanations into each section was also helpful.", "I can see the structure of the different chapters. Easy to use (intuitive)", "It was very easily navigatable.", "Separation of topics was useful.", "Topic wise distribution is very useful. Having slides also with the video was very handy.", It is efficiently, and well structured.", "Structured presentation of the course materials.", "Material well structured, easy to find what you are looking for. Provides different ways of studying (video or slides)", It's fairly intuitive, easy to navigate and most importantly, very well organized.", "It is well organized and grouped per topic. It is easy to watch certain part of lectures again, and allows you to go through the material at your own pace. It gives a clear overview of the complete timeline of the course. I also certainly prefer watching pre-recorded lectures covering the material over recordings of lectures in auditoria from past years. It was certainly a very good method to provide the necessary course material."

Some parts of the course material, the exercise session material and the quizzes of the interactive lectures, were not integrated on Nextbook. Some students would prefer that would be the case in the future. An example of a student comments that reflects this: "To have the quiz along with their corrections in Nextbook."

This year's experience therefore supports the recommendation of last year: **Integration of different types of material in one overviewable structure is worth investing in, as students clearly value these aspects.**

Connecting discussion to the course material

Similar to last year, students indicate that it is good to be able to ask questions or discuss directly connected to the course material. Some examples: "There was a possibility to ask questions by each slide, which make nextbook better than the other 'online lecture' types.", "The link between the question and the topic is also an added value.", "Portability, ability to ask questions.", "The fact that you can ask questions next to specific slides that everyone can see easily was very useful.", "Furthermore, having the possibility to ask questions directly on the slide of interest, I think is a great tool", "To see questions from other students about a specific topic and see them answered by the prof.", "Moreover, it combines the possibility of discussions with the actually contents of the course. Thus, we don't need to go to a forum or anything else to follow discussions, this lowers the threshold.", " It also made it possible to answer specific questions that came up during the preparation, which could be asked on the platform.", "The interactive character: the option to ask questions next to the relevant slide and the possibility for everyone to see them and respond.", "The slides with opportunity to ask questions are very handy. They allow us to ask questions directly at the correct location in the slides where we're stuck, which saves a lot of time that would normally be lost with finding the exact slide for example. It is also very nice that other student's questions and answers given by the professors will remain visible while studying the course.". Furthermore one student stressed explicitly that the interaction was motivating: "Interactive. Motivating."

Compared to last year students more intensively used the opportunity to ask questions and discuss connected to the course material. However, it is still observed, and confirmed by the students, that it is a small subset of students that actively asks questions and discusses. Other

students mainly read other students' questions and comments, rather than actively engaging themselves.

The way discussions are shown on Nextbook could still be improved, especially for longer conversations. As a student states: "The way to ask questions on the side of the slides is not convenient for the revision. Some of the discussions exceed the slides' vertical spaces, which even reach to the position of the next following slides." One student also comments it would be beneficial to allow more rich content (beside plain text to be used on the questions and discussions): "I think if we see who is sending the message would be better if we can send pictures. Sometimes asking questions with a picture is easier to avoid typing long questions."

This year's experience therefore supports the recommendation of last year, but now extended with the value of connecting discussion for the students: **Connecting the discussion to the course material is valuable and handy for the teacher AND STUDENT, but additional efforts are required before it can be considered as real online social learning.**

Future of Nextbook

Students agree that Nextbook should be used in the course as it provides added value, and that it has potential to be used in other courses. When asked about which Learning Analytics aspects would be helpful to be added, students are more conservative. While they believe that seeing the "hot items" could be of value, they disagree with getting feedback on their activity level, or motivational messages. Like one student expresses, potential reasons are the level of experience and self-regulation of master students and the fear to induce additional stress: "Personally, I liked its simplicity. I think that adding the suggested extra information would just add stress when you happen to have a busy week. Closer following other people's discussions might also add to that stress. In my experience most master's students know how important it is to keep up with the material and can find discussions in case they have a question." While individual students do see value in such approaches to get additional feedback "Indeed give feedback on how you are performing at the moment and what to do better".

Our recommendation Learning Analytics should be used with care and should primarily focus on showing students what students are working on.

Other aspects

While Nextbook is only one click away from the university's virtual learning environment (Toledo, a blackboard based system) , students would prefer that Nextbook's functionality is directly available in Toledo. A comment of a student that reflects this: "It is a different platform than Toledo".

Students also commented on some technical aspects:

- The user interface should better react to the devices used by the students. As stated by two students: "Scalable UI, able to adapt to all kinds of monitors", "The platform being responsive in UI on mobile devices."
- The highlighting tool was not available on the slides, as the slides were important as pictures as the system only allows to use word files as input format. As stated by a

student: "I believe that the highlighting tool would be helpful, but this was not really usable since we could not highlight anything on the slides."

As last year also one student mentioned that he/she would prefer to download the videos, for cases with bad internet connection but also because of environmental concerns: "Having the possibility to download the lectures would be great! To be able to watch them in moments where there is no internet connection, or from the phone without draining the internet of the phone contract. Also, if a lecture is watched again, by downloading it the first time there is no need to stream it again, reducing the carbon footprint of process."

Compared to last year, we did not have any comments of students struggling with getting access to the course, understanding how to interact with the platform, .. .Therefore it seems that our improved instructions and support have been effective. The recommendation of last year's run is therefore strengthened: **Provide ample opportunity for students to ask for technical assistance, and to look for ways students could also use the course material offline and download after the course for future reference after they finished the course.**

Conclusion

With the second run of our course Uncertainty in Artificial Intelligence on the nextbook platform we were able to confirm the earlier conclusions and recommendations. Interactive courseware has a potential to support blended learning. A well-chosen platform can help students find clear structure in a mix of types of material (e.g., videos, text, and slides). Furthermore, social annotation features of such platforms make it possible to connect discussion and questions and answers directly to the course material. While this feature is valued a lot by teachers and students, only a subset of the students actively uses it, and therefore we cannot say that there is already a real online learning community supporting online learning. To realize the full potential of social learning, additional efforts are required to trigger discussions and exchanges among students.

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