

CiC NEXTBOOK

Co-created Interactive Courseware

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Case study report - KU Leuven: Feedback after exam in
Applied Mechanics Part 1, 2020-2021

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The course material of this case study report is available here:

<https://nextbook.io/book/modeloplossing-ttt-tm1-2021>

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1. Context

This case study reports on an intervention with the interactive courseware platform Nextbook targeted at activating students around the exam feedback of a first-year bachelor course at KU Leuven.

The case study was executed at KU Leuven in Flanders, Belgium. KU Leuven is a highly ranked research-intensive university both regarding research and education. The course of this case study was a first-year bachelor course in engineering mechanics (Applied Mechanics, part 1), a mandatory course for students in the bachelor of Engineering Science and the bachelor of Engineering Science: Architecture. Applied Mechanics, part 1 is a course with around 700 engineering and engineering architecture students, with a low success rate (around 40%). It is considered to be a hard course by students because it is expected that they can apply basic mechanical principles of statics, dynamics, and kinematics to real-life applications.

2. Challenge

In order for students to be successful in their university studies, academic integration of first-year students is key. First-year students have to get familiar with the expectations of university education, especially regarding exams. Therefore, students can learn a lot from feedback on exams, especially after their first exams at university. At the same time, providing feedback to large groups of first year students is challenging, and activating students around this feedback seems to be even more challenging.

In order to activate students around the exam feedback, a model solution was provided on the Nextbook platform and students were invited to ask questions connected to this model solution and to start discussions.

3. Co-creation solution

The feedback after the mid-term test was offered on the Nextbook platform to **713 students**.

In the virtual learning environment students were made aware that the model solution was available and that they could ask questions regarding the model solution through the Nextbook platform.

Home > Cursusmateriaal > Examen > examen januari 2021

examen januari 2021

Toegepaste mechanica, deel 1: hoorcollege [H01B0a]

Praktisch

- Welkom & mededelingen
- Algemene Informatie
- Didactisch Team
- ECTS
- Cursusmateriaal

Leerruimte

- Lessen
- Oefenzittingen en reflectiemodules
- Werkcolleges
- Tussentijdse toets

Vragen stellen en punten

- Vragentrommel
- Reservatie monitoraat
- Examnummer en TTT-resultaten

Opgave examen

Bijgevoegde bestanden: Examen TM1 jan 2021.pdf (600,109 kB)

Modeloplossing

Bijgevoegde bestanden: Examen TM1 jan 2021_modeloplossing.pdf (12,57 MB)

Extra: vragen stellen bij modeloplossing TM1

Wat?

We willen je de mogelijkheid bieden om aan te geven bij welke aspecten van de modeloplossing je nog vragen hebt. Op basis van de vragen die binnenkomen kan de Dienst Studentenbegeleiding bekijken over welke onderdelen nog bijkomende uitleg, bv. in de vorm van filmpjes, nodig is. We gebruiken hiervoor een nieuw platform, nextbook, dat we op die manier ook kunnen "proefdraaien" voor eventuele later gebruik.

Hoe?

- 1) Surf naar bovenstaande website (nextbook)
- 2) Maak een account aan met je studentene-mailadres. **Het is zeer belangrijk dat je je studentene-mailadres van KU Leuven gebruikt anders zal je de modeloplossing niet zien.** Er wordt een activatiemail gestuurd naar je e-mailadres, die moet je eerst nog bevestigen.
- 3) Je ziet daarna de cursus met titel "modeloplossing-examen-toegepaste-mechanica-deel-1-januari-2021" bij je overzicht staan. Of surf rechtstreeks naar: <https://nextbook.io/book/modeloplossing-examen-toegepaste-mechanica-deel-1-januari-2021>
- 4) Laat daar je vragen achter volgens de instructies.

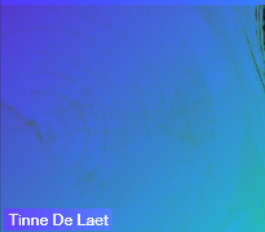
View of the virtual learning environment with the feedback after the exam. The item "Extra: vragen stellen bij modeloplossing TM1" refers to the material in Nextbook, where the model solution was made available with an opportunity for students to ask questions regarding the model solution.

The figure below shows how the Nextbook handbook, containing the model solution of the exam looks like.

Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021

Settings Tinne

Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021



Tinne De Laet

Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021

Tinne De Laet aan [KU Leuven](#)

Nederlands Lees verder →

WAT, WAAROM EN HOE?

Wat en waarom?
Hoe?

1 VRAAG I

- Opgave
- Deelvraag 1
- Deelvraag 2
- Deelvraag 3
- Deelvraag 4
- Deelvraag 5

2 VRAAG II

- Opgave
- Deelvraag K1
- Deelvraag K2
- Deelvraag V1
- Deelvraag V2
- Deelvraag V3

3 VRAAG III

- Opgave
- Deelvraag 1
- Deelvraag 2
- Deelvraag 3 en 4
- Deelvraag 5

Archiveren

Model solution of the exam of academic year 2020-2021 as offered on Nextbook.

First, students are instructed on how this model-solution can be used most beneficially, including how they can use the Nextbook functionality for asking questions or discussing the model solution.

The screenshot shows a Nextbook interface for a model solution. The title bar at the top reads 'Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021' followed by navigation links 'Wat, waarom en hoe?' and 'Wat en waarom?'. On the left, a sidebar contains a table of contents with 'WAT, WAAROM EN... Wat en waarom?' and three questions (VRAAG I, II, III). The main content area is titled 'TERUG Voorpagina' and features a large heading 'Wat, waarom en hoe?' and a sub-heading 'Wat en waarom?'. The text explains that the platform allows users to ask questions about the model solution and provides instructions on how to do so. A callout box highlights the instruction: 'Zo dus. Opgelet: Selecteer met je muis de volledige tekst "Stel hier je vragen op de opgave". Doe dat niet door dubbel te klikken maar door er met je muis over te gaan terwijl je linkermuisknop indrukt. Dan verschijnen tekstballonetjes waarmee je je vraag kan stellen.' At the bottom, there is a text input field with the placeholder 'Een vraag om te beantwoorden ...' and buttons for 'Antwoorden' and 'Verzenden'.

Instructions on how to use this model solution, including instructions on how to ask questions using Nextbook's functionality

For each of the questions of the exam, a hand-written model solution is offered.

Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021 | Vraag III | Deelvraag 1

Hide table of contents | EN H... | < | >

1 VRAAG I | Opgave | Deelvraag 1 | Deelvraag 2 | Deelvraag 3 | Deelvraag 4 | Deelvraag 5

2 VRAAG II | >

3 VRAAG III | >

< VORIGE SECTIE | Opgave | VOLGENDE SECTIE > | Deelvraag 2

Deelvraag 1

Stel hier je vragen bij deelvraag 1.

en van het aandrijfwiel. Druk deze uit in het gegeven assenstelsel.
 Vul je finale antwoord in in de tabel. Eronder is plaats voor je uitwerking.

	gondel	tussenwiel 1	tussenwiel 2	tussenwiel 3	aandrijfwiel
x-component:	$-0,209 \text{ m/s}^2$	0	0	0	0
y-component:	$0,363 \text{ m/s}^2$	0	0	0	0
z-component:	0	$-0,838 \text{ rad/s}^2$	$-0,838 \text{ rad/s}^2$	$0,838 \text{ rad/s}^2$	$-2,09 \text{ rad/s}^2$

gondel $\vec{\omega} = \omega \vec{e}_3$

$\omega = 0 \rightarrow$ geen normaal versnelling
 $\vec{a}_B = |\vec{a}_B| \vec{e}_3 = \frac{v^2}{r} \vec{e}_3 = \frac{11 \cdot \pi^2}{30 \cdot \sqrt{3/2}} \text{ m/s}^2$

tussenwiel 1 geen slip \rightarrow contactpunt tussen binnenring en tussenwiel 1 dezelfde tangentiële versnelling
 $a_{ct1} = r_{binnenring} \alpha = r_{t1} \alpha_{t1}$
 $\alpha_{t1} = \frac{6 \text{ m}}{0,25 \text{ m}} \frac{11}{30} \text{ rad/s}^2 = 9,838 \text{ rad/s}^2$
 $\vec{\alpha}_{t1} = -9,838 \text{ rad/s}^2 \vec{e}_2$

ω idem voor **tussenwiel 2**

tussenwiel 3 zelfde redenering
 $\alpha_{t3} = \frac{r_{t1}}{r_{t3}} \alpha_{t1} = \alpha_{t1} = 9,838 \text{ rad/s}^2$
 $\vec{\alpha}_{t3} = 9,838 \text{ rad/s}^2 \vec{e}_2$

aandrijfwiel zelfde redenering
 $\alpha_D = \frac{r_{t3}}{r_D} \alpha_{t3} = \frac{0,25}{9,1} 9,838 \text{ rad/s}^2 = 2,09 \text{ rad/s}^2$
 $\vec{\alpha}_D = -2,09 \text{ rad/s}^2 \vec{e}_2$

For each question a hand-written model solution is offered.

Modeloplossing Examen Toegepaste Mechanica deel 1, januari 2021 > Vraag II > Deelvraag K1

Settings Tinne

WAT, WAAROM EN...
 1 VRAAG I
 Opgave
 Deelvraag 1
 Deelvraag 2
 Deelvraag 3
 Deelvraag 4
 Deelvraag 5
 2 VRAAG II
 3 VRAAG III

VORIGE SECTIE
 Opgave

VOLGENDE SECTIE
 Deelvraag K2

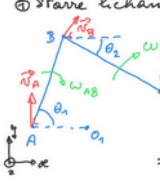
Deelvraag K1

Stel hier je vragen bij deelvraag K1.

K1. Bepaal de hoeksnelheidsvector van de staven AB en BC, stel voor met componenten in het gegeven assenstelsel. Geef in een figuur duidelijk de gebruikte snelheidsvectoren aan.

Drie manieren van oplossen:
 - kinematica van starre lichamen
 - raamgerstelde beweging
 - kinematische ketting

① Starre lichamen



$$\vec{v}_A = \frac{v}{\sin \theta} \cdot 7,9 \text{ m/s} \cdot \vec{e}_y = 0,227 \text{ m/s} \cdot \vec{e}_y$$

$$\vec{v}_B = \vec{v}_A + \vec{\omega}_{AB} \times (\vec{r}_B - \vec{r}_A)$$

$$\vec{v}_C = \vec{v}_B + \vec{\omega}_{BC} \times (\vec{r}_C - \vec{r}_B)$$

$$\begin{bmatrix} 0 \\ 0,227 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ \omega_{AB} \\ -\omega_{AB} \end{bmatrix} \times \begin{bmatrix} 1,67 \cos \theta_1 \\ 1,67 \sin \theta_1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ -\omega_{BC} \end{bmatrix} \times \begin{bmatrix} -1,67 \cos \theta_2 \\ 1,67 \sin \theta_2 \\ 0 \end{bmatrix}$$

$$\Rightarrow \omega_{AB} = 0,222 \text{ rad/s} \text{ of } \vec{\omega}_{AB} = -0,222 \text{ rad/s} \cdot \vec{e}_z$$

$$\omega_{BC} = 0,049 \text{ rad/s} \text{ of } \vec{\omega}_{BC} = -0,049 \text{ rad/s} \cdot \vec{e}_z$$

→ beide rotaties in wijzerzin

hoe weten we da de hoeksnelheid bij va 2pi/60 is? in de opgave staat er "n omwentelingen per minuut"

Er is iets misgegaan bij het omzetten van de vraag. In de vraag stond één omwenteling per minuut. Eén omwenteling komt overeen met 2*pi. Een minuut is 60 seconden, dus is de rotatiesnelheid 2*pi/60s

Jij

Antwoorden

Verzenden

Example of a student (name blanked out) interacting with the model solution and receiving an answer from the teacher.

4. Situation within co-creation framework of Bovill

We situate the co-creation solution within the framework of Bovill, 2019.

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 (713)	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)
....								

5. Discussion

In the academic year 2020-2021 all 713 students in the course were enrolled in the Nextbook handbook supporting the feedback after the final exam.

Merely one question was asked through the Nextbook platform. Students prefer to use the tools used for other material in the course to ask their questions: the discussion forum on the virtual learning environment, or ask the teaching assistants during the live feedback session. In the virtual learning environment we first offered a convenient pdf of the model solution, which introduced an additional step for students that wanted to ask a question. Furthermore, students that do not have a question themselves could also profit from the instruction on the platform. Therefore, we recommend that for the future the material should be natively offered in Nextbook and that Nextbook should not merely be used as an add-on for questions.

Acknowledgments

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