DUT

Dansk Universitetspædagogisk Tidsskrift

Indhold

Et fællesskab fylder 25

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Leder

Med dette nummer af Dansk Universitetspædagogisk Tidsskrift (DUT) fejrer vi en slags sølvbryllup. Godt nok fejrer vi ikke 25 år. Vi fejrer 25 numre. Og vi fejrer heller ikke et ægteskab. Vi fejrer et fællesskab.

Dansk Universitetspædagogisk Tidsskrift blev oprettet på initiativ af Dansk Universitetspædagogisk Netværk (DUN), og det første nummer af tidsskriftet udkom i 2006. Nummeret talte otte artikler og en leder, og i lederen hed det:

> *"Det danske universitetsmiljø har således nu fået et tidsskrift, der fokuserer på undervisning og læring ved danske videregående uddannelser. Målet er, at Dansk Universitetspædagogisk Tidsskrift kan blive forum for udveksling af universitetspædagogisk forskning, information, refleksion, kritik og inspiration og for udveksling af universitetspædagogiske erfaringer og holdninger. Det er målet, at denne udveksling både vil ske mellem undervisere indbyrdes og mellem undervisere og ledere, så tidsskriftet kan bidrage til en bred, skriftlig, tværinstitutionel universitetspædagogisk offentlighed i Danmark."*

Siden da har Dansk Universitetspædagogisk Tidsskrift været medie for 208 artikler og i tillæg hertil talrige boganmeldelser, ledere og debatindlæg. Med DUT nummer 25 lægger vi yderligere 12 artikler til.

Dansk Universitetspædagogisk Tidsskrift afspejler og er talerør for et fællesskab, et *community*, en praksis. Eller måske er det mere korrekt at sige, at tidsskriftet er mødested for en lang række fællesskaber og praksisser, for tidsskriftets læser- og forfatterskare spænder bredt hvad angår fagdiscipliner (fra humaniora til naturvidenskab), metoder (fra systematiske reviews til kvalitative analyser), problemfelter (fra kollektiv vejledning til kooperativ læring), og nationaliteter (fra Danmark og til Skotland).

Det, der binder disse fællesskaber sammen, er interessen for og kærligheden til uddannelse og læring på de videregående uddannelser. Ikke mindst derfor glædes vi i redaktionen gang på gang over, at forfatterne udgøres af undervisere, rektorer, studieledere, uddannelsesudviklere, administrative medarbejde, vejledere og – ikke mindst – studerende.

Der er i tiden en tendens til at tegne stereotyper. Én stereotyp er den studerende, som ikke gider læse, som ikke er lige så dygtig som i de gode gamle dage før masseuniversitetet, som betragter uddannelse som et middel og ikke et mål, som ikke er robust nok til vilkårene på universitetet og derfor hele tiden efterspørger hjælp og støtte. En anden stereotyp er underviseren, som i virkeligheden kun gider at forske, som egentlig ikke bryder sig særlig meget om sine studerende, som ikke har tid til at

udvikle sin undervisning og da slet ikke til at skrive universitetspædagogiske artikler og dele sine erfaringer.

Sådanne stereotyper er gift for uddannelse og læring, fordi de umuliggør det vigtige samarbejde mellem studerende og undervisere. For også uddannelse beror på et fællesskab. Ikke mindst derfor er der brug for et Dansk Universitetspædagogisk Tidsskrift. Eller en universitetspædagogisk 'offentlighed' som der blev udtrykt i lederen citeret ovenfor. Der er brug for at vi igen lærer både de studerende og underviserne at kende, og at studerende og undervisere lærer hinanden at kende.

For skulle jeg nævne én ting, som jeg i årenes løb har lært af at læse artiklerne i Dansk Universitetspædagogisk Tidsskrift, så er det dette. At studerende er forskellige, og at de handler meningsfuldt i forhold til læringssituationen, sådan som de oplever den. Og lige så underviserne, der også er forskellige, men ligeledes handler meningsfuldt i forhold til undervisningssituationen, sådan som de oplever den. Og at det interessante ikke er, hvem der bærer skylden for, at uddannelse lykkes eller mislykkes. At det interessante er at *forstå*, under hvilke omstændigheder uddannelse lykkes.

Artiklerne i Dansk Universitetspædagogisk Tidsskrift bidrager til netop dette. At forstå samspillet mellem undervisere og studerende og omstændighederne under hvilke uddannelse lykkes.

God læselyst.

Viden i Verden

Vibeke Andersson, lektor, Institut for Kultur og Globale Studier (SAMF), Aalborg Universitet

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Videnskabelig artikel, fagfællebedømt

I marts 2017 tog vi til Cuba med 17 kandidatstuderende fra 'Turisme' på Aalborg Universitet. Forløbet var en del af 'Creative Learning Camp', som var en integreret del af 8. semester på kandidatuddannelsen. I forløbet blev de studerende stillet over for en opgave sat af en amerikansk NGO om bæredygtig turisme i Viñales, Cuba, som de skulle løse, og som de skulle levere til organisationen efter deres feltarbejde. Vi diskuterer i denne artikel, hvordan det at tage de studerende ud af undervisningslokalet til en for dem ukendt kontekst kan gøre deres læring anderledes og relevant for et senere arbejdsliv, da de skulle løse en opgave 'fra det virkelige liv' kombineret med det at skulle begå sig i en helt ny kontekst. Vi er inspireret af Kolbs læringscirkel (2014), og vi diskuterer både peer learning og læring i grupper inden for denne teoretiske ramme. Vores antagelse er, at læringsprocesserne styrkes inden for PBL, hvis man inddrager en erfaringsbaseret og eksperimenterende læring i en virkelighedsnær kontekst. Vi betragter i denne sammenhæng de studerende som både medforskere og konsulenter.

Introduktion

"Vi havde nogle antagelser før vi tog til Cuba. En forståelse af Cuba. Men da vi kom ind i konteksten der, så var vi nødt til at tilpasse os på en radikal måde – ikke bare små ændringer, men en helt ny måde at tænke på, og det var godt. Det hjalp os med at forme vores semesterprojekt." (Studerende E, 30. marts 2017)[1]

Citatet er fra en studerende, da han blev interviewet om, hvordan det at være på Cuba havde influeret på hans læringsproces og hans projektarbejde. Vi har i forbindelse med de studerendes feltarbejde studeret deres læring før, under og efter opholdet i Viñales. Vores forskningsspørgsmål er: *Bliver erfaringsbaseret læring understøttet af, at de studerende kommer ud i læringsrum, der er anderledes end universitetets?* Ved at tage de studerende med i et andet læringsrum, end det der findes inden for universitets mure, bringes der aspekter i spil, som vi vil diskutere i denne artikel; samskabelse og peer learning og hvad der sker i mødet med 'den anden'. Ydermere diskuterer vi, hvordan den erfaringsbaserede og den eksperimenterende læring indgår i en proces (Kolb 2014). Vores argument er, at mødet med den anden, og i denne

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[1] Alle interviews er oprindelig foretaget på engelsk, da gruppen af studerende er international

artikel det sociokulturelle, politiske økonomiske møde med en anden, har betydning for og påvirker den måde, hvorpå de studerende lærer, både individuelt, i grupper og af hinanden. 'Den anden' (other) er et centralt begreb inden for antropologien (Eriksen 1994:33), og det er i forståelsen af 'den anden, 'at forståelsen af en selv og ens position, i dette tilfælde som turismeforsker – og konsulent – i Viñales, bliver synlig. Mødet med 'den anden' skaber altså både en forståelsesproces og en forskningsproces i en dynamisk udvikling.

Der var flere formål for de studerende med studieturen til Cuba: Dels skulle de løse en konkret opgave stillet af en amerikansk NGO, hvor fokus på bæredygtighed var centralt, og opgaven skulle løses som en konsulentopgave; dels kunne de studerende samle data ind til brug i deres 8. semester-projekter. Desuden var ideen, at de studerende skulle kunne være 'medforskere' og generere data, som både de og vi kunne bruge i vores forskning.

På Turismeuddannelsen bruger man, som på andre uddannelser på Aalborg Universitet, problembaseret læring (PBL) (Kolmos & Krogh 2002). Vi diskuterer her, hvordan og hvorfor læringen kan styrkes ved at kvalificere studerendes refleksioner og erfaringer med at være i felten i en ny kontekst med både et akademisk og et praktisk mål for øje. Desuden diskuterer vi, hvordan det kan lede til, at studerende i højere grad end ellers tager ansvar for deres egen læringsproces.

Teoretisk udgangspunkt

Vi er inspirerede af Kolbs og Deweys begreb 'experiential learning' (Kolb 2014 (1984); Dewey, 1938; Atkinson and Murrell 1988, Kolb and Kolb 2009; Chemi and Krogh 2017), som vi oversætter som 'eksperimenterede læring'. Vi vælger at tage vores udgangspunkt i feltet mellem 'active experimentation' og 'concrete experience' i vores brug af Kolbs læringsspiral (fig 1). Fordi det netop skal forstås som en spiral (Kolb 2014), argumenterer vi for, at man kan tage udgangspunkt andre steder end i 'concrete experience', som man oftest gør i analyser af læringsprocesser. Med dette analytiske greb åbner vi op for en anderledes analyse af læringsspiralen. Desuden lægger vi vægt på kontekst, et element, som vi mener er mere eller mindre fraværende i Kolbs læringsspiral.
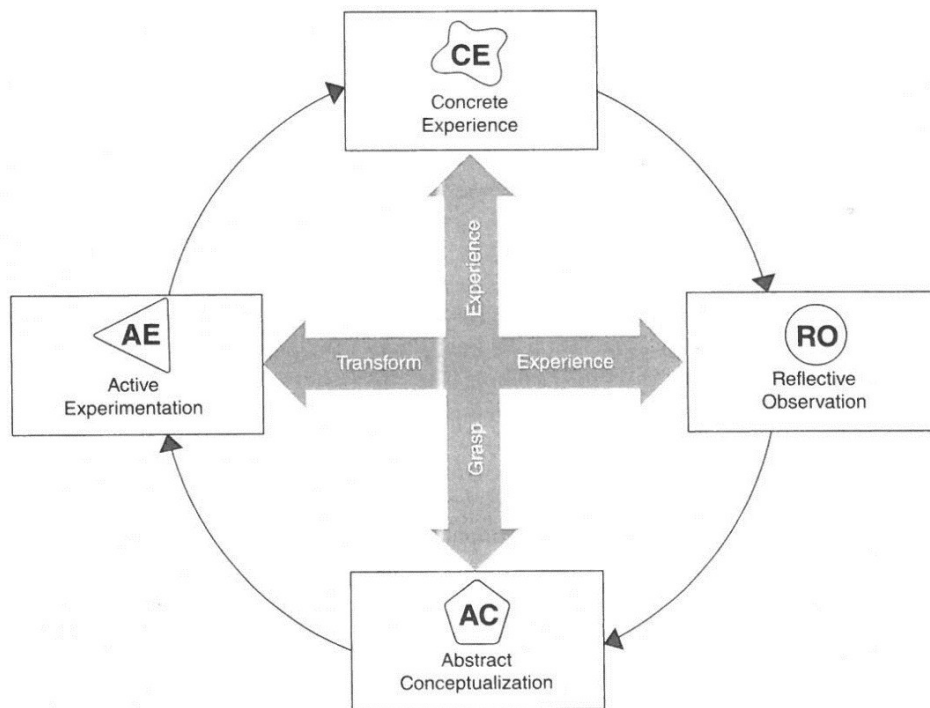
Fig 1. Kolbs læringsmodel (2014:51)

Vi vil analysere, hvordan teori om læringsprocesser kan udfordre og kvalificere PBL-modellen, og vi fokuserer på læring i grupper. For at lære i grupper, af og med hinanden, er det nødvendigt at skabe et læringsrum, hvor der er plads til dialog, udveksling af viden og erfaringer med og mellem gruppens medlemmer. PBL- modellen, som er brugt på Aalborg Universitet, skaber dette rum. Vi argumenterer for, at rummet kan udfordres ved at ændre på kontekst, og man får dermed skabt nye rum, der giver mulighed for nye refleksioner blandt de studerende.

Læring inden for problembaseret læring er baseret på, at de studerende selv tager initiativer i forhold til læringsprocessen. I casen tog vi de studerende ud af universitets læringsrum, hvilket er et af formålene med PBL; de studerende skal arbejde med emner, der tager deres udgangspunkt i et 'problem' i en sammenhæng, som skal løses praktisk og analytisk. PBL er at lære, 'hvordan man gør' i modsætning til at 'lære om' (Blichfeldt, Kvistgaard & Hird 2017). Desuden er PBL karakteriseret ved at være interdisciplinær, hvilket er et vigtigt element, da den analyse og de løsninger, som de studerende finder frem til, ligner det, de kommer ud til, når de har afsluttet deres uddannelse og skal arbejde inden for deres felt (Bosman & Dredge 2014; Gomez-Lanier 2017; Chemi & Krogh 2017).

Kolbs læringsteori er blevet kritiseret for, at den er alt for omfattende: "Part of the broad attraction of the cycle is that it accommodates both deductive (moving from abstract concepts to testing their implications) and inductive (concrete experience leading to reflective practice) approaches to theory in [..] education, thereby provid-

ing a bridge over the divide between objectivity and subjectivity, positivism and phenomenology" (Vince 1998:306). Kolb imødekommer en del af kritikken i anden udgave af bogen 'Experiential Learning' (2014), hvor han samtidig argumenterer for, at læringscirklen stadig har gyldighed, hvilket vi er enige i. Kolb argumenterer i højere grad for en spiral som illustration af læringsprocessen (2014:61), i stedet for at tænke processen som en cirkel der gentager sig. Ved at bruge spiralen som billede argumenterer Kolb for, at for hver gang læringsprocessen illustreret i cirklen er fuldført, starter man på et andet niveau end det tidligere, og dermed er der en forskel i den erfaring, der ligger til grund for processen i forhold til observation, abstrakt tænkning og aktive eksperimenter (se fig. 1).

Kolbs læringsteori er også blevet kritiseret for, at den i for høj grad beskæftiger sig med individets læring og det psykologiske aspekt ved læringen (Illeris 2007). Kolb har i senere arbejder taget højde for denne kritik (Kolb & Kolb 2009; Kolb 2014), hvor sociale aspekter bliver indarbejdet i den oprindelige læringscirkel fra 1984. Vi vil imidlertid bruge Kolbs pointe om læring som proces, hvor det at eksperimentere og reflektere i læringsprocessen indarbejdes i en proces, der leder læringen videre.

Vi vil diskutere 'co-creation of knowledge' og læring i grupper (Kolb & Kolb 2009:52; Kolmos & Krogh 2002; Egelung Holgaard, 2017). Co-creation oversætter vi med *samskabelse* (Thøgersen 2011; Ulrich 2016). Thøgersen diskuterer samskabelse af engagement i studieforløbet (2011). Vi bruger også begrebet samskabelse til at indfange engagement, men vi bruger 'engagement' som et element i den samskabelse af viden, som vi diskuterer i vores case.

Agger & Tortzen diskuterer, at 'co-creation' og 'co-production' ofte bruges i flæng i forskningslitteratur (2015:11), og at begreberne især er brugt inden for politologien og sociologien til at analysere samfundsforhold og velfærdsstat (kommuner). Vi vil imidlertid bruge begrebet 'samskabelse' (co-creation) til at diskutere, hvordan læring kan opnås inden for og imellem grupper af studerende, og ved læring fra og med peers.

Samskabelse indebærer en proces, hvor forskellige aktører udvikler noget nyt sammen (Ulrich 2016). Det adskiller sig fra samarbejde ved at det, der bliver resultatet af en fælles proces, er noget andet, som ikke ville kunne skabes af individuelle aktører hver for sig. Samskabelse og kontekst vil være nøglebegreber i det følgende. Disse begreber vil blive brugt for at kunne diskutere vores case, hvor vi argumenterer for, at nye undervisningsmetoder og et anderledes læringsrum, kan skabe en anden læring for studerende.

Metode

Vi har anvendt antropologisk metode i vores forskning, idet vi både har været deltagere og observatører. Vi havde delt rollerne imellem os, så den ene stod for den

praktiske opgave med at facilitere felten for de studerende ved at have kontaktet centrale aktører på forhånd, for at de studerende kunne komme i gang med deres (forholdsvis korte) feltarbejde. Den anden af os var primært selv på feltarbejde ved at observere de studerende i deres læringsproces. Feltarbejdet bestod i deltagerobservation og interviews med de studerende før, under og efter opholdet i Cuba samt interviews efter præsentationerne for den amerikanske NGO og den cubanske ambassadør og efter deres projekteksamen i juni.

Vi interviewede de 17 Turisme-studerende inden afrejsen om deres forventninger til deres læring i forhold til at skulle arbejde i Cuba. Vi lavede disse indledende interviews for at kunne følge og analysere den proces, som de studerende gennemgik i det, som vi kalder erfaringsbaseret og eksperimenterende læring. De spørgsmål, vi stillede, var åbne: a) Hvad er dine forventninger til forløbet på Cuba? b) Nævn 5 nøgleord, som beskriver din viden om Cuba. c) Beskriv tre måder, hvorpå du vil engagere dig i forløbet (Creative Learning Camp).

I Cuba samlede vi de studerende hver eftermiddag til opsamlingsmøder, hvor de præsenterede de udfordringer, de var stødt på i løbet af dagen. De præsenterede foreløbige resultater, og de delte data og oplysninger med hinanden, da alle havde et godt indblik i, hvad de andre grupper arbejdede med. Vi optog og transskriberede disse eftermiddagsmøder. Vi har selv samtidig afgrænset vores rolle i forhold til de studerende, så vi ikke blev aktive deltagere i deres projekter. Da de studerende efter nogle dage selv ændrede rolle fra studerende og turister til forskere, blev vores rolle ændret fra at være (styrende) undervisere til at være ressourcepersoner, som de kunne gå til, hvis de havde behov for det. Det er en vigtig pointe inden for PBL, at underviseren i projektarbejdet er *vejleder* (Kolmos & Krogh 2002).

De studerende havde inddelt sig i grupper efter forskningsinteresse. Grupperne var dem, der afleverede konsulentrapporten, og som præsenterede den for den cubanske ambassadør ved et seminar i København nogle uger efter opholdet på Cuba. Vi interviewede de studerende efter fremlæggelsen for ambassadøren. Vores spørgsmål var igen brede for at give plads til de studerendes egne refleksioner: a) Hvad lærte du ved at præsentere for ambassadøren i dag? b) Hvordan har din læringsproces været fra starten af 8. semester frem til præsentationen i dag? c) Hvad gjorde opholdet på Cuba for din læringsproces?

De studerende afleverede nogle måneder senere deres semesterprojekt, og de gik til mundtlig gruppe-eksamen på baggrund af projekterne i juni. Efter eksamen interviewede vi de studerende igen: a) Synes du, at du har fået nye kompetencer og/eller forståelser i tiden efter præsentationen for ambassadøren og frem til eksamen i dag? b) Har du fået nogle kompetencer, du kan bruge i din fremtidige karriere? c) Hvilke (faglige) udfordringer har du haft i dette semester?

Alle interviews er blevet transskriberet.

Som det fremgår, har vi som forskere været en del af processen igennem hele forløbet. Vi har også til dels styret læringsprocesserne, og derfor er vi måske ikke uden bias, i forhold til hvilke konklusioner vi drager af vores forskning. Imidlertid er en del af formålet at samskabe resultaterne med studerende (de er med-forskere). Vi bygger på et teoretisk fundament, og vi er samtidig bevidste om vores rolle som både deltagere og forskere (sammen med vores studerende).

Beskrivelse af case

Som beskrevet tidligere er der forventning om en høj grad af ansvar og selvstyring hos de studerende i PBL-modellen. Denne udfordres yderligere, når vi tager de studerende ud i en kontekst, der ikke umiddelbart er kendt for dem. De studerende var en gruppe af både internationale og danske Turisme-studerende, og 5 af dem talte spansk. De studerendes bevidsthed om deres egen baggrund øgedes betydeligt, da de kom på feltarbejde i en for dem ukendt kontekst og i mødet med den 'anden'. Deres nye roller som forskere og konsulenter skabte andre læringsprocesser, som de studerende ikke havde forventet inden afrejsen til Cuba.

> *"... Vi troede, at vi ville komme der og lave vores undersøgelser, så vi ville kunne fortælle cubanerne, hvordan 'rigtig turismeindustri' skulle se ud, men i virkeligheden lærte vi mere, end vi kunne lære dem. Det var meget anderledes, end vi havde forventet på forhånd."* (Studerende K, 6. juni 2017)

Vores argument for at udfordre de studerende ved at rejse til Cuba og give dem både en konsulentopgave og en akademisk opgave er, at det er vigtigt at uddanne kandidater, der opnår kvalifikationer, der kan bruges i deres arbejdsliv (Gomez-Lanier 2017). Skridtet fra rollen som studerende til rollen som færdig kandidat i arbejde faciliteres ved at anvende erfaringsbaseret læring. Ved at de studerende blev mødt med uventede udfordringer i felten, som skulle løses praktisk og metodisk, idet der skulle afleveres et produkt inden for en bestemt tidsramme til samarbejdspartneren (den amerikanske NGO), øgede de deres bevidsthed om, hvad det er, der skal til for at kunne bruge deres kompetencer forhold til praktiske opgaver. I stedet for at bringe arbejdsmarkedets aktører ind på universitetet bragte vi de studerende ud i verden og opfordrede dem til at 'tænke ud af boksen' i deres forslag til den amerikanske NGO og i forhold til indsamling af data til semesterprojekter. I og med at de var i en for dem så fremmed kontekst som Cuba, og i og med at de skulle lave projektstyring, blev de udfordret på en måde, som ikke er mulig i et undervisningslokale eller inden for universitetets fysiske rammer (Smith, Levi, Saniga & Stickells 2017).

Lærings-set-up

Før afrejsen til Cuba havde de studerende deltaget i kurser i teoretiske og metodiske emner, som de kunne bruge i deres arbejde. Vi havde kontaktet forskellige aktører i byen, hvor de studerendes arbejde skulle finde sted. Dette kan måske opfattes som

en lidt for styrende proces, når man tænker på, at undervisningsformen ligger inden for PBL. Men det var nødvendigt af praktiske årsager. De studerende havde kun 10 dage til deres arbejde i Cuba, hvorfor vi som ressourcepersoner valgte at facilitere adgangen til nogle ressourcer, som f.eks. på forhånd at have forberedt nogle af de statslige turismeaktører på, at der ville komme nogle studerende og interviewe dem. Dette også set i lyset af ikke blot den korte tidsramme for de studerendes feltarbejde, men også det politiske system i Cuba, da flere aktører ellers ville skulle indhente tilladelser hos turistministeriet for at få lov til at tale med de studerende. Viñales er et UNESCO-beskyttet naturområde og derfor også et attraktivt turistområde, som den cubanske regering investerer i, og flere af aktørerne talte derfor engelsk.

Da de studerende kom tilbage til Danmark, afleverede de en konsulentrapport til den amerikanske NGO om bæredygtig turismeudvikling i Viñales, som organisationen havde efterspurgt. Desuden holdt de et oplæg for den cubanske ambassadør og konsul på Aalborg Universitet, ved et seminar hvor de studerende kunne dele deres resultater med ambassadøren. Det, at de studerende skulle aflevere en konsulentopgave til den amerikanske NGO, og at de skulle præsentere deres forslag om bæredygtig turisme til ambassadøren, gjorde, at de fik en fornemmelse af, hvad det vil sige at skulle interagere med forskellige typer af aktører uden for universitetsverdenen. Dette gav mulighed for at generere erfaringer og kompetencer hos de studerende, som de kan tage med sig i deres fremtidige arbejdsliv.

Vi bruger vores delresultater (for eksempel dem fra Cuba) i vores undervisning løbende. På den måde bliver forsknings- og læringsprocessen for de studerende sammenvævede i en kontinuerlig proces (Chemi & Krogh 2017), hvor processen for de studerende er, at den viden, der opnås via samarbejde og dialog, bliver omsat til erfaring (Dewey 1938; Kyed & Pedersen 2016; Kjær-Rasmussen & Jensen 2017), der kan bruges både i kommende universitetsprojekter og i arbejdslivet efter universitetet.

Vi har brugt tre af de studerende, som var på Cuba, som studenterundervisere på et 9. semester-forløb, og vi har kunnet samle op på, hvordan læringsprocessen har været for studenterunderviserne, samtidig med at vi kunne skabe nye undervisningsformer sammen med de studerende ved at inddrage dem til at undervise deres peers.

Resultater og diskussion

Peer learning

De studerendes læring under opholdet i Cuba var mangesidig. De lærte ikke kun fra de erfaringer og refleksioner på erfaringer, de fik individuelt, som er indeholdt i Kolbs læringsspiral (2014). De lærte også ved at dele deres erfaringer og ved at arbejde i grupper, hvor de delte deres oplevelser og resultater med alle de andre stu-

derende ved de eftermiddagssessioner, vi havde hver dag. Som illustration af dette sagde en studerende efter at være kommet tilbage til Danmark:

> *"Det er første gang, jeg har samarbejdet på denne her måde. Det er ikke den første gang, jeg har indsamlet mit eget data, men første gang, jeg har arbejdet sammen med så stor en gruppe, hvor alle arbejdede med det samme emne. Folk indsamlede forskellige typer data, diskuterede det, og man kunne reflektere over, hvordan det er blevet fortolket og opfattet af forskellige mennesker."* (Studerende H, 30. marts 2017)

Vi argumenterer for, at netop konteksten og samskabelse af viden styrkede de studerendes læringsprocesser på en ny måde, som skaber en platform for Kolbs erfaringsbaserede læring (Kolb 2014). Her tænker vi ikke blot på den cubanske kontekst, men også konteksten i form af, at de alle havde det samme felt, som de fik noget forskelligt ud af, og derfor blev de inspirerede af hinanden og hinandens resultater.

Vi observerede dette under eftermiddagssessionerne, hvor de studerende efter nogle dage gennemgik en proces, hvor de begyndte at reflektere over deres observationer i stedet for at referere dem. De begyndte at bruge begreber, de var blevet præsenteret for i undervisningen inden afrejsen til Cuba, på nye og innovative måder. I den proces fik de sammen analyseret sig frem til nye indsigter ved at udveksle viden og forståelser med hinanden og hinandens feltarbejde i en fælles læringsproces. De studerende betragtede sig selv som 'turister' de første dage under opholdet i Viñales. Dette blev tydeligt, fordi de studerende kommenterede og beskrev deres oplevelser i felten som 'gode' og 'dårlige' oplevelser, og vi kunne se, at det materiale, de studerende indsamlede og diskuterede de første dage, alle havde lige gyldighed. Efterhånden begyndte de at reflektere over deres materiale og gruppere det i forhold begreber og teoretisk ramme. Noget blev vigtigere end andet, og begreberne pegede på, hvad der var vigtigt, og hvad der ikke var. I de interviews, vi lavede, efter de var kommet tilbage til Danmark, bemærkede de studerende selv, hvordan de var gået igennem en proces, hvor de havde bevæget sig fra at være observatører ('turister') til forskere. De kunne selv se, hvordan de gradvist begyndte at bruge teorier og begreber, når de diskuterede deres feltobservationer med hinanden. Deres læringskurve steg dramatisk, fordi de delte deres resultater og skabte læring indbyrdes.

De studerendes viden og analyse kom op på et andet abstraktionsniveau gennem læringsprocessen (Kolb 2014; Kolb and Kolb 2009; Vince 1998, Gomez-Lanier 2017). De kunne bygge på de analytiske færdigheder, de havde opnået i Cuba, efter de kom tilbage til Danmark, hvor de brugte deres materiale i både konsulentrapporter og semesterprojekter. I overvejelserne over, hvorvidt 'problemstillinger fra det virkelige liv' betød noget for de studerende og deres læring, siger en af de studerende:

> *"Jeg ville svare 'ja', for vi havde mulighed for at arbejde mere med vores projekt og tænke over, hvad der kunne være relevant for os og for analysen ved hjælp af teo-*

rierne. Derfor ændrede vi faktisk vores teorivalg og fandt frem til vores problemformulering. Vi endte med at ændre den grundlæggende idé bag projektet." (Studerende L, 16. juni 2017)

Kontekstens betydning

Mens vi var på Cuba, kunne vi se, at det ville være nødvendigt at introducere de studerende for mere teori, som var relateret til Cuba. Vi organiserede en 'miniforelæsning' om udviklingsperspektivet, specielt alternativ udvikling og lokal deltagelse, eftersom nogle af de studerende var udfordret af, at de ikke havde begreber, de kunne anvende. Vi ser dette som en del af PBL processen, selvom nogle måske kunne argumentere for, at det var for styrende. Imidlertid argumenterer vi for, at det var en del af en proces af samskabelse af viden, som kunne løfte de studerendes abstraktionsniveau i den konkrete situation. Disse små 'skub' fra os som ressourcepersoner kunne være med til at åbne felten for de studerende, som udtrykt her:

"Man er nødt til at opleve destinationen for at forstå: 'Hvad er det for et sted?', 'hvem er de her folk?', 'hvad er situationen?'. Uden at forstå konteksten kan man på ingen måde begynde at skabe noget, for eksempel et produkt eller en rapport." (Studerende C, 15. juni 2017)

Vores observationer ligner dem, som Gomez-Lanier (2017) finder i sin case. Hun tager designstuderende med til New York og Kina, hvor de møder centrale aktører inden for design-feltet. Hun beskriver, hvordan studieture øger de studerendes refleksionsniveau.

Vi argumenterer for, at studerende, hvis de får en konkret opgave, som de skal aflevere efterfølgende til en aktør uden for universitetsverdenen, lærer selv at arbejde med analytiske begreber i en konkret kontekst. Da vi spurgte en studerende efter semesteret, om det havde hjulpet med til at opnå færdigheder, blev der svaret:

"Ja. Arbejdet med vores semesterprojekt har fået os til at reflektere over, hvordan PBL-tilgangen har påvirket projektet, vores arbejde, de indsamlede data, vores forforståelse osv. Så vi har været i kontakt med konteksten, både imens vi var på Cuba, og imens vi lavede vores analyse." (Studerende E, 15. juni 2017)

Som beskrevet før så er interdisciplinær læring en central del af PBL, og det er vigtigt for de studerendes opnåelse af viden (Bosman & Dredge 2014). En studerende udtrykker det således:

"Jeg har fået en større forståelse for, at alle fag og emner, som vi har arbejdet med i løbet af de sidste to semestre, indgår i en hvilken som helst karriere, som man kan forfølge. Man kan ikke sige: 'Jeg vil kun arbejde med policy' – alt vil være en del af det. Så man kan godt vælge et fokusområde, men det er nødvendigt at have en bred viden om alle emnerne." (Studerende C, 15. juni 2017)

Erfaringsbaseret læring

Vidensdeling indgår i, hvad Kolb & Kolb kalder 'deep learning' (2005). Læringsprocessen er i 'deep learning' netop en proces, hvor der er flere 'trin' og dermed flere erkendelser, der fører til en ny slags læringsproces. Vi har tidligere anført, at vi observerede, hvordan de studerende gik fra at opfatte sig selv som 'turister' til at opfatte sig selv som forskere. Dette kan ses af citatet her:

> *"Vi snakkede om forskellige forventninger. Eksempelvis i forhold til turene, hvor vi forventer en tur på to timer, men får en tur, som varer fire timer. For dem virker det som en god service, men for os kan det være irriterende. Der kan være forskellige forventninger til, hvad turisten egentlig vil have, og hvad værten tror, at turisten vil have." (Studerende B, gruppediskussion 7. marts 2017)*

Den type læringsproces, som den studerende giver udtryk for her, er svær at opnå i undervisningslokalet og til forelæsninger, også selvom man inviterer aktører fra 'det virkelige liv' indenfor på universitetet. Her bliver formidlingsmetoderne ofte til foredrag eller forelæsninger. Når studerende er i felten og arbejder med opgaver, der skal løses for forskellige modtagere (NGO og universitet), bliver deres refleksioner mere nuancerede og gennemtænkte, idet de kan se nye sider af problemstillinger, som de måske ikke ellers ville have fået øje på. Ifølge Kolb (2014) handler den erfaringsbaserede læring netop om, at de studerende skal kunne gøre sig erfaringen ved at handle og eksperimentere og ikke kun kognitivt høre og forstå. I vores case vil vi argumentere for, at de studerende 'gennemlever' de forskellige dimensioner i Kolbs læringsspiral, og at dette giver et løft i læringen. Vores argument er her, at ikke kun feltarbejde (som er en integreret del af for eksempel antropologien) er nødvendigt for at indsamle materiale ved hjælp af forskellige metoder, men også at det at blive sat i en ny kontekst kan føre til, at læringsprocessen kvalificeres. Dermed kunne man sætte et element mere ind i Kolbs læringsspiral, nemlig kontekst:
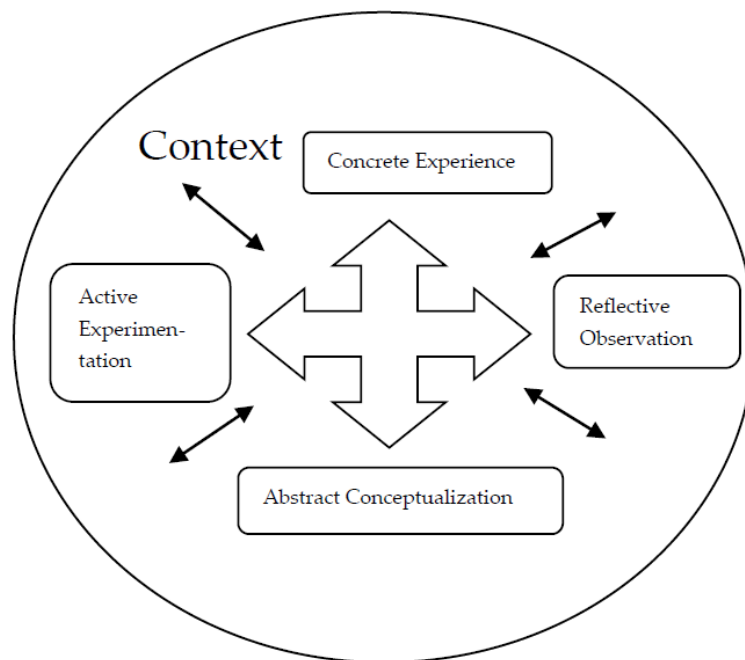
Figur 2. Eksperimentel og erfaringsbaseret læring, inspireret af Kolb (2014)

Der er andre former for konkret læring forbundet med vores case; den korte tid før afleveringen af en konsulentopgave giver de studerende en ide om, hvad det vil sige at arbejde med projektstyring, noget, som de vil møde i deres arbejdsliv. Denne metode kan være med til at skabe sammenhæng mellem universitet og arbejdsliv (Gomez-Lanier 2017; Yorke 2006). To studerende udtrykker det på denne måde:

"Opholdet i Cuba var den mest lærerige oplevelse på 8. semester, og det gav os mulighed for at se, at teorien ikke altid passer på virkeligheden. Jeg lærte mere af denne oplevelse, end jeg gjorde af kun at være til undervisningen." (Studerende K, 30. marts 2017)

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"Vi fik en masse viden, som man ikke kan finde i litteraturen eller slå op. Vi fik også erfaring med, hvor vigtigt det er altid at være så 'lokal' som muligt og at interagere med de lokale. Eftersom vores research omhandlede Casas Particulares (Bed and Breakfast) og lokalsamfundet, var det meget givtigt at være til stede og være en del af lokalsamfundet." (Studerende J, 30. marts 2017)

Som det ses af et af citaterne ovenfor, så kan de studerende se nødvendigheden af at kunne benytte teorier til 'problemer' i det virkelige liv på en anden måde efter at have været i Cuba. Vores argument er, at fordi de skulle løse en konsulentopgave, samtidig med at de kunne samle materiale ind til deres universitetsprojekt, fik de en større forståelse for de forskellige former for viden, som det at være i en ny kontekst kan åbne for. De bliver mere parate til at indgå på arbejdsmarkedet, hvilket universiteter har stigende fokus på i disse år. PBL og erfaringsbaseret læring er gode redskaber til at skabe koblingen mellem studie og arbejdsliv, og vi har 'udvidet' PBL til

også at blive brugt inden for en helt ny kontekst, som er fremmed for de studerende, og som de skal forholde sig til via de færdigheder, de har opnået ved at arbejde med PBL tidligere i deres uddannelse. Nøglefærdigheder og kernekompetencer er essentielle for universitetsuddannelser. Disse opnås i høj grad ved undervisning inden for universitets mure. Vi argumenterer i lighed med andre (Bosman & Dredge 2014, Blichfeldt et al 2017, Gomez-Lanier 2017) for, at færdigheder opnås bedst, hvis de studerende også bruger dem uden for universitetet, og med opgaver der ligner dem, de skal løse i deres arbejdsliv. Når vi lægger så stærk vægt på at tage de studerende ud, så afspejles det også i det, de studerende siger om deres oplevelse af opholdet i Cuba:

> *"Det ændrede tingene. Det fremhævede virkelig vigtigheden af kontekst, for man kan læse en masse tekster, men man kan ikke nødvendigvis anvende dem i alle situationer." (Studerende J, 30. marts 2017)*

De studerende opnåede et mere holistisk perspektiv på kompleksiteten i at studere bæredygtig turisme i Viñales:

> *"Jamen, den første [udfordring] er, som allerede nævnt, at teorien ikke passer på Cuba, og dét var det primære problem i løbet af hele processen. Vi var nødt til konstant at gentænke og udvide teorierne, så de blev mere brugbare – og samtidig være kritiske hele tiden. Jeg tror, at dét var den største udfordring." (Studerende D, 15. juni 2017)*

og

> *"At arbejde med de konkrete cases, finde en fremgangsmåde og tilpasse sig til casene og konteksterne. Dét tror jeg vil være en brugbar færdighed senere hen, for man får måske en masse idéer, når man sidder ved et skrivebord og laver teoretisk arbejde, men når man så møder en kontekst, er man nødt til at lære at tilpasse sig den, arbejde med den og passe på den." (Studerende E, 15. juni 2017)*

Vi erfarede, hvordan de studerende tog ansvar som en gruppe og imellem dem selv, så vores rolle langsomt skiftede fra at være undervisere til at være ressourcepersoner. De studerende tog aktivt ansvaret for deres egen læring, og de blev gode til at samskabe viden og dele deres resultater grupperne imellem – til gavn for alle studerende.

Konklusion

Vi spurgte i vores forskningsspørgsmål, om erfaringsbaseret læring bliver understøttet af, at de studerende kommer ud i læringsrum, der er anderledes end universitetets. Vi tog studerende ud i verden, i en kontekst som er helt fremmed for dem, og spørgsmålet er, om det øger og kvalificerer deres læring. Ifølge en af de studerende, der var med, så er det i høj grad tilfældet:

"Ja, for på universitetet arbejder vi hovedsageligt med bæredygtighedsteori, mens vi på Cuba lærte, hvordan det faktisk fungerer i virkeligheden. Det gjorde vi ved at tale med de lokale om bæredygtighed, skrive projektet, undersøge policies og arbejde med den viden, som vi fik på Cuba. Jeg lærte, hvor vigtigt det er at arbejde bottom-up og inkludere lokalsamfundets medlemmer i beslutningsprocesserne." (Studerende M, 15. juni 2017)

Vores analyse har vist, at studerende i høj grad lærer ved at være involverede og dermed motiverede til at lære, som Kolb viser i sin læringsspiral (2014). Studerende lærer imidlertid ikke kun individuelt, men i grupper, og det at være i grupper øger både vidensdeling, den kritiske refleksion og samskabelse af viden.

Det at indsamle sit eget materiale giver ikke kun færdigheder i at arbejde empirisk. Det giver også færdigheder i kritisk at skulle udfolde en metode og arbejde med teori:

"Jeg synes, at en meget vigtig del af vores semesterprojekt er metodeafsnittet. Ikke på grund af den traditionelle metodologi, som vi lærer om fra bøger, men dét at kunne forklare på en akademisk måde, hvordan det rent faktisk foregår, når man er i felten. Det er fint at sidde derhjemme og læse om, hvordan man udfører et interview eller laver deltagerobservation, men man opdager, at alting ændrer sig, når man befinder sig i en anderledes kulturel kontekst." (Studerende H, 5. juni 2017)

Engagement og motivation er en væsentlig forudsætning for læringsprocesserne i en kontekst, der er ukendt for de studerende. Når der stilles krav til, eller der er forventninger fra de andre studerende om, at alle bidrager og samskaber, vil de ofte være mere engagerede, og resultatet af deres arbejde bliver bedre og mere kritisk reflekterende. Vi har været inspirerede af Kolbs læringsspiral. Vi har udbygget den med et lag af 'kontekst' omkring cirklen, og vi har argumenteret for, at læring i grupper giver en anden form for læring, end den individuelle læring som Kolbs model oprindelig opererede med. På trods af dette mener vi, at det giver mening at bruge Kolb i en PBL-sammenhæng, da de forskellige elementer i cirklen, som gentages og dermed danner en spiral, er et af kernefundamenterne i den problembaserede læring eller den erfaringsbaserede og eksperimentelle læring. Kolbs ideer kan derfor kvalificere PBL-tilgangen, når man tilføjer kontekst som et vigtigt element, som vi har gjort det i figur 2. I stedet for at de studerende henter cases fra 'det virkelige liv', som man ofte gør i PBL-modellen, så tager vi et skridt videre og flytter hele undervisningen ud i verden (et andet læringsrum), og lader de studerende agere der i deres læringsproces. Det specielle ved vores kontekst er, at den ud over at være 'derude' også er i en anden kulturel kontekst. Dette presser de studerende til at forholde sig til den anden, en anden kultur, og det giver dem en ekstra dimension i deres læring, idet man i mødet med den anden lærer om sig selv (Eriksen 1994).

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PhD supervision strategies in a cross-cultural setting: Enriching learning opportunities

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Research article, peer-reviewed

Recent research findings highlight the importance of supervisors' feedback aimed at helping students how to learn by themselves to develop their thinking. Responding to the current focus on internationalization of universities, this article explores how PhD supervisors can help foster critical thinking. Based on qualitative interviews with four African double degree doctoral students, as well as participant observation, the article highlights reflections on different supervisory strategies and dilemmas faced in a cross-cultural academic setting, and the importance of meta-communication in addressing them. Results showed that the students appreciated the more informal student-supervisor relationship, exacerbated through collaborative fieldwork experiences, as well as the use of visual tools for stimulating creative and critical thinking. However, results also showed that the coaching supervision style was experienced as unclear and scary by one student, underscoring that the supervision process is a mutual learning process in need of recurrent adaptation.

Introduction and problem statement

In a recent analysis of doctoral students' learning processes, Odena and Burgess (2017, p. 578) found that '*Supervisors' most helpful feedback appeared to be aimed at helping students learn how to learn by themselves, supporting the development of their critical thinking and writing*'. This interesting finding offers a relevant starting point for questioning how supervisors can help foster critical thinking, and it became a key question for my own development as a (PhD) supervisor, understanding critical thinking in a broad sense as the ability to reflect critically, not just scientifically in a disciplinary context, but also on 'personal experiences and the world at large' (Erikson & Erikson, 2018, p. 2), as well as the disposition to use this ability. Given the university focus on internationalization, I explore the supervision of PhD students who come from Global South countries with a colonial history, and therefore, academic cultures formed by colonial relations of power and colonial institutions, despite decades of decolonization processes (Mbembe, 2016). I am inspired by literature that challenges generalized stereotyping of international doctoral students (Goode,

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2007), especially what Doyle and colleagues call *'deficit constructions of African students'* (Doyle, Manathunga, Prinsen, Tallon, & Cornforth, 2018, p. 2), when Northern/Western scholars focus narrow-mindedly on what African students are not, rather than with what they contribute. In this setup, what does helpful feedback look like? And how can supervisors help facilitate critical thinking in cross-cultural research collaboration?[1]

To address these questions, I have made a small qualitative study, based on interviews with four PhD students who participate in the international research collaboration, of which I am part. Through interviews, I examine the supervisor-student relations, and focus on communication as an important element in the relationship, with special attention given to meta-communication. Furthermore, I explore the student learning experiences associated with three different types of written feedback: corrective feedback, positive feedback and interrogatory feedback, as well as the learning-experiences associated with using visual tools such as diagrams or flowcharts. The purpose is to learn more about how supervisors, engaged in cross-cultural supervision, can support and facilitate learning among doctoral students, through reflections on their feedback. Considering the facilitation of critical thinking as an important general academic skill, supervisors try and balance supervision strategies that aim to pass on established criteria for research quality with those that aim to encourage students to question authority through critical thinking (Erikson & Erikson, 2018). While the encountered dilemmas in cross-cultural supervision collaborations are often similar to those in other supervision setups, they may be more intense (Winchester-Seeto et al., 2014). However, exposure to dilemmas in a cross-cultural setup can be productive (Xu & Grant, 2017), containing much food for thought for reflecting upon one's own practice (Ai, 2017).

This small qualitative study is set within a five-year research programme on the development effects of foreign agricultural investments, funded by the Danish Research Council for Development Research. This programme involves collaborative research activities and PhD supervision by two Danish research institutions and two universities in Sub-Saharan Africa. The programme involves four PhD students from Tanzania and Uganda, enrolled as double-degree students at a Danish university. At the time of writing the article, the students had been working for one year, and each had four to six (co-) supervisors, spread between the two universities where they are enrolled. As a co-supervisor of two, and research colleague of the other two PhD students, I focus the article on my supervision strategies in this cross-cultural setup, and the related reflexive learning process. I do not claim that I, or any of my col-

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[1] While it would also be relevant to examine the relationships and communication between (co-) supervisors, it is not the focus in this article.

leagues or students, exemplify our institutions or cross-cultural settings in general. I simply use my work setting as a basis for my reflections, and hope that this qualitative study can add to the picture of cross-cultural supervision.

Literature review on nurturing critical thinking in cross-cultural supervision settings

Supervising students from a different academic tradition, and collaboration between co-supervisors ingrained in different academic cultures require an awareness of the roles and responsibilities of supervisors, and hence, students. Like many other Western supervisors, I view my supervisory role as being a facilitator of student learning processes. Understanding learning as socially situated practice, it is necessary to pay close attention to the teacher-student relation in addition to the wider environment surrounding the learner (Illeris, 2015; Lave & Packer, 2011), as well as the formation of (academic) identity (Ai, 2017). The facilitating approach to supervision views the supervisor role as a delicate balance between domination and negligence, in which the supervisor constantly faces dilemmas and new choices between supervision strategies (Bastalich, 2017; Delamont, Parry, & Atkinson, 1998; Lee, 2008; Vehviläinen & Löfström, 2016). Inspired by Deuchar's analysis of doctoral supervision styles (2008) and their alignment with student needs, and the idea-historical teaching/learning approaches mentioned by Molly & Kobayashi (2014), I view a coaching approach as being appropriate to facilitate learning, and thereby orient myself towards what Vehviläinen and Löfström (2016) call the *dialogical supervisory culture* (see also Halse, 2011). In a study of African international doctoral students in New Zealand, Doyle et al. argue that '*mutually respectful, dialogic approaches to supervision and the recognition of the intellectual resources diverse students bring with them are features of effective intercultural supervision teaching and learning*' (Doyle et al., 2018, p. 3). Similarly, in his autoethnographic narrative about academic identity formation as an international student in Australia, Ai (2017) describes the (idealized) dialogical relationship as '*a productive space where supervisors and international students can get to know the ethnic other and the ethnic self*' (p.1104).

Internationalization and power-issues in academia

The personal and academic identity of supervisors as well as students, is shaped by their experiences, as well as the academic culture they have been raised in, and this influences their relations and interactions (Adriansen, Madsen, & Jensen, 2015; Ai, 2017; Elliot & Kobayashi, 2017; Molly & Kobayashi, 2014). However, within a wider academic context the relationship is skewed, influenced by power-issues and lack of reciprocity between academic cultures, characterized by Northern or Western dominance (Bash, 2009; Doyle & Manathunga, 2017; Doyle et al., 2018). I concur with Xu and Grant (2017, p. 571) that '*cultural differences can be productive rather than solely*

problematic in supervision'. However, in a cross-cultural research context, it is relevant to consider 'intensifiers' of the issues PhD students and their supervisors typically encounter, even when they come from similar academic cultures (Winchester-Seeto et al., 2014). Winchester-Seeto and her colleagues identified eight such intensifiers, and I find 'cultural differences in dealing with hierarchy', and 'separation from support' especially relevant in relation to the western ideal of critical thinking (Winchester-Seeto et al, 2014:615), which is closely related to the article's opening question of how to help students learn to learn by themselves.

Analysing international PhD students in a European context, Goode (2007) discusses and criticizes the commonly used concepts of dependent and independent learners, as she sees them as concepts that create a 'deficit narrative, an "infantilising" discourse that characterises [all students who are labelled as "dependent"] as immature learners' (p. 592). However, Goode points out that the individualization of learning contained in the discourse of the ideal of independent learners underestimates that *learning happens as a collaborative process*, which reflects a constructivist learning approach (de Beer & Mason, 2009), or what Halse calls participatory and practice-based learning (Halse, 2011, p. 558). Goode argues that *'Academic success and failure are neither the property of the individual students nor of the instruction they receive, but lie rather in the relationships between students and the practices in which they and their teachers engage during the course of their ongoing interactions'* (p. 589). Through her study, she shows that the discourse of independence can be an obstacle for international doctoral students. Xu & Grant (2017) elegantly show how *'progression towards autonomy [is] accompanied by the emergence of new areas of dependence'* (p. 574), and thus, that progression towards 'hands off' supervision and student autonomy should not be considered a steady or linear process. Instead, supervisory style adjustments must be tailored in an adaptive and interactive manner to the individual student's development. Following the same line of thought, Grant (2003) proposes that stimulus and support in learning and socializing graduate students should not depend on one or two supervisors, but should to a larger degree involve the community of the department. In cross-cultural research collaborations, however, this further highlights the relevance of supervisors spending time on getting to know students' previous experiences, their strengths and ambitions, as well as to engage in mutual reflections on the supervisor-student relationship, learning ideals and reactions to feedback, among other issues (Doyle & Manathunga, 2017). Although far from being the only source of inspiration and learning, the supervisor often has a key role as a gate into the new academic culture and therefore can play an important part in the students' transition (Halse, 2011), especially for international doctoral students who are typically separated from their familiar support networks (Doyle et al., 2018). The important role of the supervisor(s) and their professional and personal qualities are

further highlighted by Ai (2017) and Xu & Grant (2017), who stress the importance of supervisors' cultural recognition, which goes further than respect.

Several authors highlight the need for explicitly addressing *expectations* between supervisors and students (See for example Andersen & Jensen, 2007; Doyle & Manathunga, 2017). Kobayashi (2014) developed and analysed the use of formally prepared material for discussing expectations. The literature highlights the importance of making explicit the criteria supervisors use for assessing quality. This is especially important in double-degree programmes, as supervisors from different academic cultures may use alternative evaluative criteria (Elliot and Kobayashi 2017).

The role of metacommunication in nurturing critical thinking

Balterzensen's (2013) review of supervision processes underscores the role of *metacommunication* (i.e. communicating about how we communicate), both with regard to having a transparent communication style, and at a higher level, the strategic approach to the collaborative learning process. Several authors recommend that supervisors understand a desired change in students' approach to learning as a pedagogical challenge to be mutually discussed, rather than as a supervisor responsibility (Doyle & Manathunga, 2017; Molly & Kobayashi, 2014; Vehviläinen & Löfström, 2016; Xu & Grant, 2017).[2] Vehviläinen & Löfström (2016) found that language, supervision style, feedback styles and questions influence students' learning and critical thinking, and the previously mentioned study by Odena & Burgess (2017) also highlights the importance of communication for the student-supervisor relationship, as well as for the students' academic identity formation, and the changes in this over time (see also Ai, 2017 and Xu & Grant, 2017). Along the same line, Andersen & Jensen (2007) recommend that (graduate) supervisors become more conscious about the dialogue, conversation and interview techniques used during supervision. Here, it is especially relevant to take into account that international doctoral students may experience an 'intensifier' of potential challenges due to cultural difference in dealing with hierarchy (Winchester-Seeto et al., 2014) – a hierarchy that the western academic supervisor may not take sufficiently into account. Analysing experiences of international doctoral students, Ai (2017) and Xu & Grant (2017) highlight the importance of dialogue, the patience of the supervisor and his or her ability to give the student space to reflect, in order for critical thinking to develop. Likewise, a recent study among PhD students in New Zealand, Australia, the UK and Canada found the degree to which supervisors encouraged students to think and act autonomously is associated with greater research self-efficacy in the student (Overall, Deane, & Peterson, 2011).

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[2] See Bastalich (2017) for a review of what literature says about different supervision styles and supervision-student relations.

Feedback is part of the communication that takes place between supervisor and student, with the purpose of creating learning in the student. Reinecker et al (2005) recommend that supervisors prioritize, but limit their comments, especially when giving comments in writing. Following a finding that conversational comments can be used to cover broader and more sensitive elements than written comments (Bash, 2009; Doyle & Manathunga, 2017; Doyle et al., 2018), Könings et al. (2016) recommend the use of videoconferences as a supervision tool when students and supervisors are in different locations – again, a relevant finding for international research collaboration and PhD-training.

The above-mentioned 'dialoguing or coaching supervision approach' raises the question of how feedback and exemplary comments can be given in ways that support a student's development toward a *critical and creative thinker*. Handal & Lauvås (2005) highlight the importance of giving specific feedback, also when it is positive, and propose that supervisors let the student speak first (for a proposal on a 'contract' for interaction, see Reinecker, Jørgensen, Dolin, & Ingerslev, 2013). Caffarella and Barnett (2000) found in their study of learning processes related to scientific writing that a sustained and strong critiquing process, in which students (learn to) give and receive useful feedback, is important for learning how to become an academic writer. Yet, in the context of graduate supervision, Reinecker et al. (2005) warn against feedback that is too text-specific, because such feedback may not include overall comments related to the structuring elements of the work, such as research question, overall argument, etc. Doyle et al. (2018) found that some African international doctoral students understood supervisors' short written questions about clarification of parts of a text as a proposal for eliminating text, and thus that more explicit comments about which elements require clarification in feedback (see also Doyle & Manathunga 2017), or maybe, more meta-communication is required (Balterzersen, 2013).

Vehviläinen & Löfström (2016) refer to a previous study by Vehviläinen (2009), arguing that feedback is not enough to create independent thinking on its own. Rather, there is a need for *interactional tools that elicit student views*.[3] Diezmann (2005) uses mind-maps and outline-views as a way of stimulating critical thinking and awareness of different ways of doing things, for example structuring a text. An interesting study by Brodin (2016) finds that the *encouragement of students' sense of agency* in their design of research and what she calls 'pragmatic action' are crucial factors for improving their critical and creative thinking (See also Brodin & Frick, 2011). However, research on capacity building through cross-cultural academic collaboration also highlights the inherent challenges (Adriansen et al., 2015).

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[3] Xu and Grant (2017) and Ai (2007) also highlight the importance of supervisors eliciting student views, although they do not do so through visual tools.

Summing up, the literature shows a high degree of agreement with regards to the adequacy of a dialoguing or coaching supervision approach for helping students develop critical thinking, and that encouragement of students to think and act autonomously, as well as the use of visual tools like mind-maps, help stimulate students' critical thinking. However, with important exceptions (including Ai, 2017; Xu & Grant, 2017) these findings do not come from cross-cultural supervision settings, and thus remain apart from the growing body of literature dealing with supervision of international doctoral students from non-western backgrounds. This literature calls for reciprocity and intellectual equality, employing post-colonial theories to cross-cultural supervision, for example. It has identified a number of 'intensifiers' of challenges for this (diverse) group of students in Northern/Western contexts, partly due to supervisor's stereotyping and lack of cultural recognition. The remainder of this article aims to contribute to fill this gap.

Methodology and empirical basis

Based on the above, I wanted to use my recent enrolment in a Teaching and Learning in Higher Education course as an opportunity to learn how to improve my supervision of, and contribution to the four PhD students in the international research programme I work in. Taking advantage of a collaborative field visit with the students in Tanzania and Uganda, I designed a semi-structured interview guide focusing on what I call moments of intensive learning experiences[4] during the past year, both to learn from their learning experiences, and to see whether the supervisor-student relations were, explicitly or implicitly, inferred, in relation to these intensive learning experiences.[5] The interview guide also contained questions regarding the individual student's reactions to, and reflections about learning outcomes from three different types of feedback, as well as exposure to more visual tools for creative thinking and conveying ideas. [6] Questions on their reactions to different types of feedback were chosen to give a concrete and shared frame of reference for the interview and the student's reflection on learning outcomes where attempts had been made to include metacommunication.

In addition to the individual interviews performed during four weeks of collaborative fieldwork, I also draw upon participant observations in field research activities, in-

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[4] Taking into account that learning happens in many different settings, and therefore wanting to include learning experiences that were outside of the ordinary 'supervision at supervisors office', I asked the students to think about experiences or moments that had been exceptionally learning-dense for them; experiences from which they had learned a lot; learning experiences that had made a difference for them.

[5] The comments about supervisor-student relations emerging from the interviews about learning outcomes and students' reflections on these make up an emergent category in my analysis.

[6] These were the four pre-defined categories of my interview guide: Reactions to: 1) positive feedback; 2) corrective comments; 3) interrogatory comments and 4) the use of visual tools such as diagrams, flowcharts and mind maps.

cluding daily team dialogues. The research team in each country consisted of two PhD students, two of their national supervisors, as well as two of their Danish supervisors. Notes were taken regarding learning processes, interactions, relations and questions posed by the PhDs during our fieldwork, and interviews were recorded and detailed notes were elaborated on this basis. Furthermore, as a backdrop for my analysis, I revisited notes from the entire first year of supervision and interaction with the PhD students during their two-month stay in Denmark, via skype, email and during international conference participation.

Not only are there issues of power and hierarchy with being one of the co-supervisors for two of the PhD students, that are likely to affect the replies from the students, but there are also ethical questions (Kvale & Brinkmann, 2009). I explained about the pedagogical learning process that I was enrolled in through the Teaching and Learning in Higher Education programme, to ensure that the students were well informed. I explained the objective and focus of my enquiry, which was to reflect on my practice as supervisor, as well as gaining a better understanding of my part of the relationship as (co)supervisor and colleague. I also explained that if they agreed to be interviewed, the interviews would be treated confidentially, and possible quotes would be anonymised. All four gave their consent.

While the empirical data for this article come from a small sample, effort was invested in designing the qualitative aspects of the study, with dense note-taking and close personal relations. I make no claim of representativeness in this qualitative study, but argue that the observed dilemmas can have relevance beyond the specific research programme, within the context of cross-cultural PhD supervision.

Results and analysis

Metacommunication and clarification of (mutual) expectations

Differences in academic cultures can be present in any inter-institutional work, but probably tend to be more distinct and frequent in international collaborations, especially between academic environments with markedly different histories and traditions. This can not only intensify challenges, but also enrich learning opportunities for students and supervisors (see for example Doyle & Manathunga, 2017; Winchester-Seeto et al., 2014). Facing supervisory dilemmas, for example between wanting to nurture critical thinking while having to address the fear related to thinking independently, meta-communication about the pedagogical challenges can help guide a choice of supervisory role, based on mutual reflection. The experienced differences in academic culture were exemplified in one interview, where a PhD student, referring to his home university, explained that *'traditionally, the supervisor will say "do this", and give his input, and add, "if you do not do this, please do not come back"…',* indicating that there is not much room for discussion or for the student to find his own

way forward. The cultural differences in dealing with hierarchy is one of the 'intensifiers' identified by Winchester-Seeto and colleagues (2014), highlighting that supervisors must pay attention to this difference, if the supervisor wants to understand the students' reactions and help establish a relationship that simultaneously attempts to understand the background and experience of the student, while also influencing alternative ways of interacting.

All four PhD students mentioned their participation in an introductory course for new PhDs when they were interviewed about what assignments or situations had spurred intensive moments of learning. They also highlighted that the encouragement for them to *'become owners of their own PhD project'* was an eye-opening concept, and it changed how they related to supervisors, as well as to their own learning process. Based on the students' initiative, post-introductory course supervision meetings between the students and their supervisors in Denmark embraced a checklist developed by S. Kobayashi (2014) as a guide for discussing mutual expectations regarding the supervision process and collaboration regarding the PhD process. This not only encouraged all of us to voice different experiences and expectations, but also to reflect on how to deal with such differences in a constructive and acknowledging way. Discussing challenges and clarifying (reciprocal) expectations was used as a way to create room for mutual dialogue about the expected challenges in the PhD supervision process.

However, it was obvious from the interviews that especially one of the students was unfamiliar with the abstraction level and the reflective process it demands to talk about the learning processes and communication itself. Despite being a doctoral candidate, the student was unaware of inner learning processes, even when given prompts and ideas for reflection. This was a huge challenge for me as supervisor, as it prevented the development of a common language regarding student, learning processes, which is a *sine qua non* for progressive development of knowledge in the student (and supervisor) about what helps the student learn, and how the student can learn how to learn, as formulated by Odena & Burgess (2017). It shows that although the meta-communication and reflective exercises advanced a consciousness for most of the students about how they learn by themselves, it did not work for all.

Expectations and the different experiences and competences of students and supervisors were explored in almost every face-to-face supervisor-student session in Denmark, as well as in the subsequent skype supervision meetings. Furthermore, I tried to initiate talks on a regular basis with the students about what comments, interactions and feedback were helpful, and which were not. While having been taught to conceptualize a supervision process as transitions through different stages that requires that the supervisor repeatedly *'reconfigure and reframe their role, practice and identity'* in response to students' progression (Halse, 2011, p. 566), I still found it

challenging to identify the student needs and adjust my supervisory role accordingly, especially when it would challenge my ambition to foster critical thinking – and my maybe taken-for-granted conceptions about how to achieve this. For example, one of the students requested more concrete tasks, and thus a more hands-on supervision style during our mutual reflections on supervision and communication. While appreciating the honesty, I feared that adjusting my supervision style as requested would postpone or even undermine my contribution towards teaching him how to learn by himself.

The student-supervisor relationship

One of the students referred to the student-supervisor-relation, when asked about examples of situations that had caused intense learning, describing it in the following way: '*My supervisor allows me to be able to fall and get up; to find myself. That is the most important thing as a student. Like a baby is not criticized that she is falling until she learns to walk by herself. That is how I feel about our relationship [...]. Allowing the student to find themselves, their level, is very important, instead of spoon-feeding*'.

Another student also highlighted the student-supervisor relation as one of the elements that had been most important in stimulating his learning: *"We are used to being spoon-fed and maybe we do not allow someone to come out of your shell and be yourself... because I think you learn better that way than by being told that you have to do ABCD. Those three things [PhD intro-course; PhD course using flow-charts as part of analytical tool; individual probing by supervisors to come up with alternative explanations] have improved my way of thinking and working. Also the relationship I have with you supervisors; the way we have moved around: I would have been holding back, feared that it might be used against me... but I do not feel that way. We learn'.* In addition to the relationship in itself, the quote also shows that the interaction in diverse settings, and doing collaborative fieldwork was important for providing opportunities for getting to know each other beyond the more formal interaction in university offices. This offers an example of the team having succeeded by including the students in inspiring research practices with sound and respectful collegial interactions, thereby ensuring that the learning becomes a collaborative process (see Goode 2007). However, it is interesting to see that both students use the term 'spoon-feeding', which Goode (2007) mentions as a term typically used in the deficiency discourse about (mainly international) students who do not fit the 'independent learner' ideal (Goode 2007:593). This could also be seen as an internalization of the 'deficit constructions' regarding African international doctoral students, the prevalence of which Doyle et al. (2018) point out.

All four students highlighted the importance of face-to-face comments, and strongly recommended the use of skype-meetings as follow-up on written comments (by email). The preference of conversation above written exchanges is probably linked

to having a stronger personal and less formalistic contact and thus providing a communication medium that better supports the coaching-supervision tradition and one where questions are encouraged. It resonates with findings by Könings et al (2016) and Doyle and Manathunga (2017).

Collaborative research practices as source of intensive learning

Collaborative research practices were mentioned as a source of intensive learning by three of the four students. Every evening during the fieldwork we would have group reflections about what was learned and the implications thereof for the next interviews, for our understanding of the object of our study and working-hypotheses. Referring to these evening reflections, one student noted: *'I learn things [about something] I might have taken for granted… maybe I did not notice, but some colleague may see something [...] and it makes me reflect and pay attention to new things'.*

The student also highlighted another experience containing intensive learning from doing fieldwork and reflecting together, by referring to an interview situation where one of his Danish supervisors probed into specific terms used by a local woman in an interview. He explained: *'I felt it as if the skin on my head was being stretched from learning [...]. It taught me to listen to the people, what term they use, and still interrogate… Because, you may think you understand, if you do not probe… you go deeper and then you understand differently. It was a moment of wake-up in the fieldwork. This is very important. Validity of information – so much can come out of that small statement'.*

An important element of the intensive learning was the opportunity to discuss freely, even basic questions. The freedom to discuss and develop thinking through the interaction during the collaborative fieldwork was invaluable. According to this student, this was *'not always an option at the university'*. This supports the recommendation by Hemer (2012) for supervisors to be conscious about the influence of the context of the supervision. For example, the supervisor-student role may be reversed by sometimes moving the supervision conversation from the supervisors' familiar territory of their office to somewhere else, or as found by Xu & Grant (2017), when students' home culture becomes part of the research. This can lead to a more dynamic and reciprocal supervisory relationship, and one of mutual learning.

Learning experiences from different types of feedback & assignments

Because much of the interaction between supervisors and students in the research programme happens via email and comments to electronic texts, I have chosen to use different types of feedback, given mainly but not only to written texts, as pre-defined categories in my analysis of learning experiences. These included positive feedback, corrective feedback and interrogatory comments. The use of assignments including the use of visual tools as diagrams, flowcharts and mind maps was included as a fourth pre-defined category.

Positive feedback

Two of the students referred to positive feedback as something important that motivated them and gave them confidence. Both described that they could use the positive feedback beyond the concrete comments as an example of something that works well, and then try to apply this to other parts of the text. '*It becomes a frame of reference [for me], of how to improve the text*'. Positive feedback helped the students because they better knew what to retain in a text. However, the students often revealed binary thinking of 'right' and 'wrong', and asked supervisors to guide them in order to not 'waste time', i.e. revealing a product orientation rather than an appreciation for the learning *process* (Tofteskov, 1996).

Corrective comments

While it is important to spell out evaluation criteria and exemplary comments, it may also be important to give some suggestions about how to improve an analysis, for example, at least in early phases of the PhD process. However, I frequently held back with providing concrete solutions, thinking that the PhD students should develop the ability to do so themselves. Through metacommunication I would explain why I held back, to ensure that the student did not think that it was either out of ignorance or out of lack of engagement. Yet, it created fear in one of the students when specific 'recipes' for improvement were not forthcoming. Consequently, through the interviews I realized that I had to differentiate the level of corrective comments and proposals for solutions further. To facilitate a soft transition into 'learning how to learn', I would stress that my proposals for solutions were only that: proposals, and that after all, it was the student's arguments, pro and con, that ultimately mattered.

Interrogatory comments

Some of the students appreciated when comments were given in the form of questions. One student expressed that it '*gives room to think*',[7] while another student explained that he preferred comments as questions, because it gave him an opportunity to clarify misunderstandings. The third student saw questions as something that stimulated deeper reflection. However, they added that they did not learn from just a question mark or 'please explain', but asked for questions to be made specific, like explaining which idea in an argument was unclear – comments which fit with the findings by Doyle et al. (2018). However, interrogatory comments provoked fear in

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[7] Yet the student added '*...I only get frustrated when I read different things that say different things from different authors*'. I see this as an expression of an ideal of static knowledge, and for research findings to 'fit' nicely, at the expense of mismatches stimulating curiosity and additional questions being asked. While this may easily be explained by individual character combined with professional background, I wonder whether more hierarchical academic cultures also influence such an ideal, and as such could be considered an expression of the intensifier regarding cultural differences in how to relate to hierarchies, where scientific results are viewed as the maximum authority.

the fourth student. *'I would prefer […] that you say something* [concrete] *so that at least I know [that] this is how I am supposed to be thinking'[…] 'If I get open questions, I get puzzled… I get --- scared'.* The student was looking to have rules, norms and traditions within the field being mediated through the supervisor, rather than raising curiosity through questions and discussions. This could be understood as an individualized reaction to exposure to foreign academic traditions and supervision-styles (e.g. Molly & Kobayashi, 2014), that were intensified by cultural differences in how to deal with hierarchy, here represented by the student-supervisor relation (Winchester-Seeto et al., 2014). It highlights the need for the supervision-style to be adjusted to the individual student, depending on the student's preference. The student responses have made me reflect on my supervision style and I realized that I have to make larger adjustments from my own preferred style than I initially thought, in order to be able to facilitate learning better. However, this does not solve the dilemma that arises regarding how long to continue accommodating individual student needs, versus when to draw the line and conclude that too little progress is being made towards the University's expectations of what a PhD requires in terms of critical thinking.

Visual tools as diagrams, flowcharts and mind maps

One of the students described the use of diagrams and other visual tools as something that helped him get new ideas and make [his own] sense of things. *'I felt that through the exercise of the flowchart, I made sense of a lot of things, and I got new ideas. […] It helped me develop my own thoughts on this'.* Probing about which resources he drew upon when developing a flowchart, he described it as *'thinking… independent thinking. I get an idea. […] It is freedom to think out of the box, without just using literature, and then <u>later</u> go to the literature to see whether what you are thinking, what you put in the flowchart, fits with what people write about, and then identify gaps…'.* This spurred a talk about the possibility of using visual methods like mind maps to map or organize literature into different strands of arguments or lines of thoughts, rather than 'getting confused' by the fact that literature does not agree. This also sharpens our critical eye to the elements (whether research design, operationalization of concepts or context) that make different literature depart from each other, rather than searching for literature to 'confirm' a certain viewpoint. Once again this is related to the ideal of critical thinking and its different position in different academic environments. Another student saw the benefit of visual tools as a good way to summarize. Yet, he also described how making a diagram helped him get into the driver's seat and find his own position in literature discussions: *'Every author has a different view on variables… and once you get into the sea of literature, because there is so much written… it may be confusing, but then you can start to see which one will help you, with your study, because every author sees elements differently'.*

Both experiences seem to confirm the suggestion by Diezmann (2005) and Brodin (2016) about the relevance of using visual methods for stimulating critical, independent and creative thinking. Again, the forth student had nothing concrete to say about how or whether the use of visual or graphical methods stimulated his learning or thinking, and I interpret this as a lack of conscientiousness about his inner learning processes. My interpretation is that the student was caught in a mode of reproduction of knowledge, rather than thinking critically, therefore responding to the stimulation of visual tools, with fear. However, this might also be an example of a mismatch in supervision style and student approach.

Discussion and conclusion

A coaching supervision approach aims to facilitate learning processes about how students can learn to learn for themselves. Meta communication about learning processes and goals can help direct attention to and develop a shared awareness about learning processes and supervision styles that match each individual student (Balterzersen, 2013; Molly & Kobayashi, 2014; Vehviläinen & Löfström, 2016), and give the supervisor important inputs about how and what to adjust in a continuous, collective process of development. Although learning is understood as a collaborative, social practice (Goode, 2007; Halse, 2011, De Beer & Manson 2009), it also includes identity formation (Ai, 2017). Another important part of supervision that aims to support critical thinking is the provision of space for students to generate their own reflections, proposals and errors (Ai, 2017; Balterzersen, 2013; Vehviläinen & Löfström, 2016). However, taking into consideration the 'intensifiers' of challenges faced by doctoral students in cross-cultural contexts, as identified by Winchester-Seeto et al (2014), such setups require that supervisors understand root causes of different difficulties, and help tackle them. One way is through dialogue and mutual reflection, so that differences (including cultural differences for example in dealing with hierarchy) can be identified and used for mutual learning, leading to adjustments in the supervision style, or possibly to a new understanding of 'the other' (Ai, 2017; Doyle & Manathunga, 2017; Xu & Grant, 2017).

Differences in supervision-learning cultures may require that PhD supervisors spend extra time on instruction and reflection with their students, as pointed out by Goode (2007). It is essential to spend time on developing and reflecting on the relationship with the students in a way that recognizes the intellectual resources and pre-experiences that each student brings, and encourages them to employ them (Doyle et al., 2018; Xu & Grant, 2017). Engaging in collaborative fieldwork may be one way to create a more dynamic and reciprocal supervisory relationship of mutual learning.

Literature (Brodin, 2016; Diezmann, 2005; Odena & Burgess, 2017; Overall et al., 2011; Vehviläinen & Löfström, 2016), as well as the empirical data for this assignment suggest that supervisors (and students) can benefit from giving comments as

questions, as it leaves room for students to think for themselves, explain themselves and find ways forward. However, based on this small qualitative study, as well as findings by Doyle et al (2018), questions should clarify what content needs more explanation or exploration, because students seem to prefer more explicit comments and clarification.

Visual methods for communication and thinking about the research can also stimulate critical and creative thinking (see also Brodin & Frick, 2011; Vehviläinen & Löfström, 2016). However, for some, feedback or assignments that involve methods that demand independent and critical thinking may provoke fear rather than creativity and development of new ideas. For these students, exposure to non-familiar academic expectations with different learning styles may prove too much of an emotional roller coaster. Therefore, while my research to some extent supports the finding that the degree to which supervisors encourage students to think and act autonomously is associated with greater self-efficacy in students (Overall, Deane and Peterson 2011), I would argue that the statement should be modified to require that due attention be paid to identity processes, processes of becoming (whether doctoral student or supervisor) and getting both student and supervisor to know and understand the types of feedback and interaction that each is familiar with (Doyle et al. 2018) so that the supervisor can design an adaptive learning process. This seems to be especially relevant in cross-cultural contexts.

Furthermore, metacommunication is essential for creating a common language about the pedagogical challenges that supervision (also of international doctoral students) poses, and how to overcome them. Encouragement and the supervisor's awareness about supporting the students' sense of agency and ownership, both through communication (written and oral) and through practice, is also important (Doyle et al 2018; Elliot & Kobayashi 2017), especially for overcoming 'deficit constructions' (Doyle & Manathunga, 2017; Goode, 2007).

Dilemmas between supervisory strategies that arise in international doctoral supervision share many commonalities with other supervision processes, albeit with several 'intensifiers' present (Winchester-Seeto et al. 2014). While these intensifiers are challenging for both students and supervisors, they also offer unique opportunities to learn about one-self and challenge ideals about one's practices as a supervisor and researcher.

Acknowledgement

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It takes two to tango: The interaction paradox in management education

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Practice paper, peer-reviewed

In this paper, we argue that we face an interaction paradox in management education. We thus have a situation where students want to talk to their teachers and teachers want to engage in dialogue but neither side seems to get anywhere. Using qualitative and quantitative data from both business school students and teachers, we explore the reasons for this paradox and look for possible solutions. Based on our analysis and interpretation of the data, we propose a conceptual model that shows how feedback is fundamental for effective learning. The conceptual model can be used to understand the interaction paradox. It has implications for both individual teachers and, on an institutional level, for creating conditions conducive for effective feedback and dialogue between students and teachers.

Introduction

It is our contention that modern management education faces an interaction paradox, where both teachers and students clamour for more interaction and dialogue but both sides are left wanting. On the one side, we have students asking for more feedback on their work, in particular to monitor their individual progress towards meeting the learning goals that they will be tested on during exams. On the other side, we have teachers who want to engage with students in a more meaningful manner than the monologues they often find themselves performing in order to learn how they are doing as teachers and whether students are learning what they should. This is the root of the interaction paradox: that students and teachers are looking for different things when interacting.

In this paper, we strive to understand the paradox from the perspective of both teachers and students – to explore what they want and why they are frustrated. Because students and teachers are not aligned in what they crave, we have to explore related, but asymmetrical questions: Why do students feel the need for feedback? Why is it important for teachers to create dialogue? Thereby we hope to be able to understand the nature of the interaction paradox and begin to consider how to deal with it in practice.

The paper is structured as follows. First, we review the literature on feedback and dialogue in education, focusing in particular on management education. Next, we describe the empirical setting of our study and the methods used for generating and

analysing data. In our analysis of the empirical material, we then explore students' need for feedback and how teachers try to create dialogue. After these empirically derived reflections, we try to develop a model that can be used to reflect on feedback and dialogue in teaching and learning practice. Finally, we discuss our findings and present some implications of our analysis.

Feedback and dialogue in (management) education

From the teaching and learning literature we know that dialogue is more than simply a conversation; it is a set of practices – listening, respecting, suspending, voicing – that, taken together, provide the potential to discover new insights and expand understandings (Bigelow et al., 2015; Laurillard, 2013). Effective dialogue is adaptive, discursive, interactive and reflective (Beech et al., 2010; Laurillard, 2013; Nicol, 2010).

Even though the idea that dialogue is essential for successful teaching and learning is widely accepted in the educational literature (Laurillard, 2013; Nicol, 2010; Palincsar, 1998; Vygotsky, 2012), many of the teaching activities that take place in the modern mass university are based on a transmission model, and the 'massification of higher education and the popularity of business schools have led to large class sizes that, ostensibly at least, do not lend themselves to relational approaches' (Anderson et al., 2017: 25). Instead teachers engage in one-way communication in large auditoriums: their monologues only occasionally interrupted by questions from students, small case discussions involving a subset of students or uneasy silences when the teacher asks a question and no one dares answer. This is unfortunate, because participatory learning activities can increase relational understanding and reflexive capabilities (Bissett & Saunders, 2015), thus overcoming the narrow functionalist/technical focus sometimes associated with management education (Bissett & Saunders, 2015; Srinivasan, 2007).

Effective dialogue should be adaptive by focusing on student's needs; discursive through two-way communication; interactive between actions and task goals and reflective on the feedback process (Nicol, 2010).

Feedback is a particularly important form of interaction from the students' perspective because it is seen to be able to help them learn how to perform better in exams. Feedback can be understood as a communication process where the student perceives and interprets feedback on their performance and where the teacher tries to create student-centred learning (Sadler, 2010). Feedback is information provided by teachers, peers, literature, self, etc., on student performance or understanding. Feedback is a consequence of performance and is provided on student performance (Hattie & Timperley, 2007); the feedback will – hopefully – enhance the student's understanding (Hounsell et al. 2008) and thereby increase his or her level of performance. Effective feedback helps students ascertain what they grasp and what not,

where their understanding is or is not good, and points to how to improve their performance (Ambrose et al., 2010).

Feedback is considered fundamental for effective learning because it clarifies the relation between present performance levels and learning objectives for both students and teachers. Yet, feedback is one of the most problematic aspects of student experience (Carless et al., 2011) and a contentious and confusing issue throughout higher education institutions (Boud & Molloy, 2013).

Despite the considerable time and effort that teachers invest in providing student feedback, feedback seems to have limited impact when students do not get the idea, understand the meaning and/or lack the needed critical background knowledge regarding task agreement, quality and criteria (Sadler, 2010). Often students do not even bother to collect feedback on their examinations, which many universities are obliged to provide (Dysthe, 2011; Nicol, 2010; Sinclair & Cleland, 2007). This creates frustrations for teachers who feel that their efforts are wasted and can have an impact on their future behaviour.

Although the literature generally finds feedback to be one of the most important elements in effective teaching and learning processes (Hattie & Timperley, 2007; Havnes et al., 2012; Hounsell et al., 2008; Nicol, 2010; Weaver, 2006), scholars emphasize that the importance of classroom feedback is an under-researched area (Hattie & Timperley, 2007), especially when it comes to students' perception of feedback (Weaver, 2006). While it is agreed that feedback is central, the predicament in providing satisfactory levels of feedback to students is a recognized and persistent problem in the modern mass university (Carless et al., 2011).

Often teachers' and students perceptions' of feedback diverge (Havnes et al., 2012), but what they do agree on is that feedback is often inefficient. Studies have revealed that students want feedback and that timely, personal, thorough, constructive, positive (or at least balanced) comments and criticism increase the likelihood of students embracing the feedback (Weaver, 2006). However, one study found that more than 40 per cent of the students questioned in a survey considered appropriate and timely feedback to be the weakest feature (Weaver, 2006). In student satisfaction surveys, feedback typically scores the lowest among all course features and students often call for more detailed feedback in a one-to-one setting (Nicol, 2010). Many teachers, meanwhile, claim that feedback is not working (Weaver, 2006) or that (more than half of) students do not collect their formative feedback (Sinclair & Cleland, 2007). Therefore, it is perhaps not surprising to find studies showing that teachers speculate whether providing feedback is worthwhile, as it is time consuming to give when students are not using it anyway (Dysthe, 2011; Nicol, 2010). Hence, teachers may become discouraged (Sadler, 2010).

When both students and teachers are dissatisfied with the feedback concept, it is a symptom of an impoverished dialogue (Nicol, 2010). The emergence of the mass university has meant that dialogue and one-to-one discussions between teacher and student are often squeezed out due to the increase in student numbers (Nicol, 2010). The result is inefficient formative assessment because timely and useful feedback is difficult when student numbers and hence teacher workload increase (Weaver, 2006). Nicol (2010) argues that only when a dialogue is reinstated in student-teacher interaction, can we expect feedback to be effective. Dialogic feedback is an interactive exchange where interpretations are shared, meanings negotiated and expectations clarified (Carless et al., 2011). For the teacher, dialogue is the most important part of the feedback process, while feedback is a primary element in formative assessment (Havnes et al., 2012; Sadler, 2010) when a teacher wants to align or re-align the learning process in order to improve students' understanding and help them become self-regulated learners (Carless, 2006).

Hattie and Timperley (2007) suggest that effective feedback should address three main questions: (1) Where am I heading/what are my goals? (2) What is the progress I made to reach my goal? (3) Where to next/what do I need to do to improve the process? These questions correspond to notions of 'feed up', 'feedback' and 'feed forward.' Ideally, both students and teachers should seek to answer all three questions.

It is not sufficient to focus only on performance levels. Additionally, feedback also has to reflect the learning objectives that define the desired level of performance. To be effective, feedback must be clear, purposeful, meaningful and related to students' prior knowledge so that they can make logical connections (Hattie & Timperley, 2007). Feedback will be more relevant to students – and therefore more likely to be successful – if it is related to tests or assignments that have not yet been completed (Havnes et al., 2012).

Empirical Setting and Methodology

The empirical setting of this study is Aarhus BSS (Aarhus School of Business and Social Sciences), which is a part of Aarhus University. Aarhus BSS is one of the largest business schools in Europe and offers a wide range of degree programmes within fields such as economics, business, engineering, political science and communication at the Bachelor's, Master's and PhD levels.

For this paper, we focus on two MSc programmes offered by the Department of Management (MGMT): ITKO – an IT, communication and management programme taught in Danish – and cand.merc. (MSc in Economics and Business Administration). Under the cand.merc.-umbrella, we focus on six specializations that are all taught in English: Business Intelligence; Information Management; International Business; Marketing; Strategy, Organization & Leadership and Innovation Management. These

programmes have a shared set of learning goals, and according to the Academic Regulations (Board of Studies for Economics and Business Administration, 2015) this means that the graduate has acquired knowledge enabling him/her:

- To understand and consider knowledge pertaining to the various disciplines as well as to identify academic issues;

- To master the scientific methodologies and tools of the various disciplines as well as to master general skills associated with employment within the areas studied;

- To assess and choose among the scientific methodologies and tools of the various disciplines as well as to develop new analysis and solution models;

- To discuss professional and academic issues with specialists and laymen alike;

- To manage work and development situations that are complex, unpredictable and which require new solution models

These learning goals are difficult to achieve without having dialogue and interaction between teachers and students, with the latter needing feedback on their performance in order to reach these goals.

The size of the classes, in the relevant programmes, range from 15 to 350 students, where smaller classes of 15-40 students are infrequent and primarily used for electives; midsize classes of 60-180 students are normal on the master-level, and classes of 200-350 students might occur on methods courses shared by students in different cand.merc. specializations. Large class sizes are also frequent on the bachelor level programme. In other words, engaging in dialogue and feedback is often difficult for teachers as well as for students because of the big class sizes. The result is a situation that has been described as the 'Danish Wall of Silence' by foreign teachers when they start teaching at Aarhus BSS.

To explore the interaction paradox in this setting, we use a combination of quantitative and qualitative data. Quantitative data stem from Aarhus University's 2014 study environment survey (Jensen et al., 2014a, 2014b). The survey questionnaire was developed using concepts and experience gained in previous years. It was sent to directors of study and to the Aarhus University Student Council for consultation. Finally, it was tested in four focus groups, one for each of the four main academic areas at Aarhus University (Arts; Business and Social Sciences; Health; Science and Technology). Data were collected by means of an online questionnaire; in March 2014, all full-time students at Aarhus University received a link to the questionnaire by email. Data collection continued through mid-April 2014. The overall response rate was 40 per cent, with 13,647 students completing the survey. At 36 per cent, the response

rate was slightly lower at Aarhus BSS, where 4,633 out of 12,375 students completed the survey.

Table 1: Study Environment Survey Response Rate

	Business and Social Sciences	ITKO	Cand. merc.(total)	Business intelligence	Information management	International Business	Marketing	Strategy, organization & Leadership	Innovation Management
Number of answers	**4,633**	**86**	**204**	11	13	48	56	48	28
Response rate	**36%**	**47%**	**34%**	30%	31%	36%	30%	38%	41%

Source: Study Environment 2014 Aarhus University (Jensen et al., 2014a, 2014b)

Amongst a host of questions related to student wellbeing, the Study Environment survey included four questions related to feedback: 'I receive sufficient feedback regarding my performance during the semester'; 'The feedback I get on my work helps me improve my ways of learning and studying'; 'The feedback I get on my assignments/work clarifies things I had not fully comprehended'; and 'The possibility of receiving feedback regarding my academic performance is good'.

We use a subset of the data from the Study Environment survey that is relevant for the two MSc programmes at MGMT: ITKO and cand.merc. (see Table 1).

Data useful for understanding the background for the findings on students' demand for feedback was provided through the biannual focus group-like 'Student Panel meetings' with MSc students for each of the department's MSc programmes. The benefit of these group interviews is that they usually create dynamic interaction among the participants, which often leads to spontaneous and emotional discussions (Kvale, 1996). The purpose of Student Panels is to get student feedback on their general and overall impression of the content and teaching of the courses as well as the progression and relationship between the courses offered within each programme. Student Panels typically consist of 4-6 students depending on the number of students enrolled in the programme in question. Department members participating in the meetings include the Head of MSc programmes, the respective programme coordinator and the administrative secretary. At these meetings, students are specifically asked to address participative learning and whether they received feedback on their work during or after completion of the course.

The data set on the teachers' wish for (more) dialogue was generated by means of an e-mail-based structured interview with teachers of the same students. This resulted in an idea catalogue with the purpose of promoting and facilitating knowledge exchange between lecturers across the various programmes. The teachers were asked to describe their experience of giving feedback and having dialogues in face-to-face as well as in an e-mail/online learning platform (Blackboard) setting. Eighteen out of 51 teachers answered the mail, which gives a response rate of 35 per cent. This data was subjected to two cycles of coding. The first cycle was open coding, where the answers were given descriptive codes (Miles & Huberman, 1984) based on the topics that the teachers mentioned (Saldaña, 2013). The second cycle consisted of pattern coding, where first-cycle codes were grouped into more meaningful thematic codes (Miles & Huberman, 1984; Saldaña, 2013).

In the following section, we address the results of the student survey in order to uncover the extent of the wish for feedback and why students feel they need (more) feedback. These findings will be related to the conceptual model developed later in this paper, where we argue that feedback is related to participative learning. Next, we address the students' understanding of participative learning based on the focus group discussions. We then present our results regarding the teachers' understanding of participative learning based on the structured e-mail-based interview.

Results I: Students and their need for feedback

Students want more feedback

The importance of receiving feedback for student learning is highlighted in the Study Environment survey (Jensen et al., 2014a). The results for BSS show that only a third of students agree that they get sufficient feedback regarding their efforts during the semester. This is highlighted by the following quote from the report:

> *The teachers should provide more feedback generally – in connection with exams and also on a daily basis. It is easy to feel unsure of yourself when you don't do as well as you expected, and you don't know exactly where it's going wrong. (Student, BSS) (Jensen et al., 2014a: 40).*

The Study Environment survey dealt with students at Aarhus University in general. In this paper, we want to be more specific and therefore focus on the ITKO and cand.merc. programmes offered by our department. The six cand.merc. specializations offered by MGMT share the same structure: introductory courses in first semester, more advanced courses in the second semester, a third semester devoted to electives, exchange abroad and/or internships and a fourth semester, where students write their final thesis on a topic of their own choosing. Subject to approval by the study board, the individual courses are designed by the teachers involved and may therefore differ in terms of didactics, types of exams and other structural es-

sentials. In other words, the amount and type of feedback provided in the individual courses in the MSc programmes differ widely.

This is also true in another of the department's MSc programmes: ITKO (IT, Communication and Organization). However, what is interesting in relation to the topic of this paper is that the ITKO programme has institutionalized feedback and participative learning. This gives us the opportunity to examine whether institutionalized feedback can play a role in solving the interaction paradox and the perceived lack of feedback. The ITKO programme specifically aims to develop students' ability to take part in project group work. Every semester, this type of participative learning is evaluated through a project exam where feedback is a compulsory part. These two study programmes are compared with all study programmes at the faculty of Business and Social Sciences at Aarhus University.

Figure 1: The Study Environment Study – Feedback
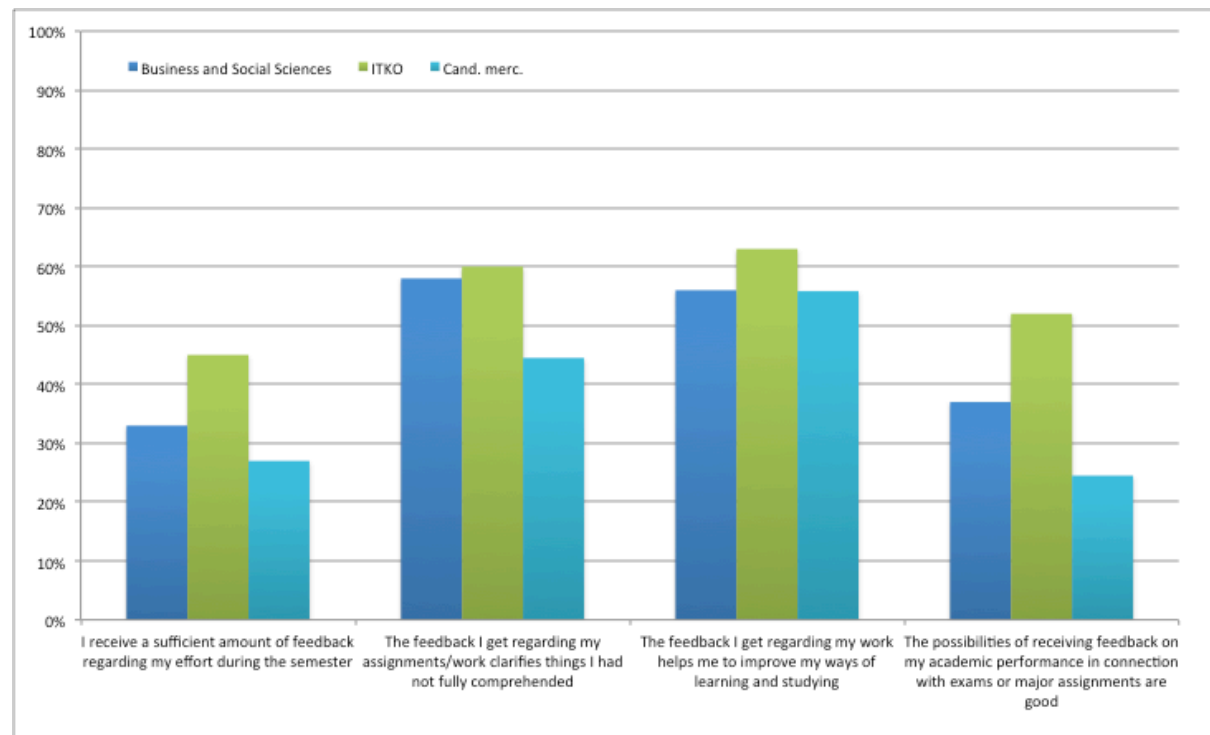
Source: Study Environment 2014 Aarhus University (Jensen et al., 2014a, 2014b)

Figure 1 illustrates the extent of the wish for feedback and why students feel the need for feedback. First of all, it is clear that the students want more feedback: less than half of the ITKO students and less than a quarter of the MSc students state that they receive sufficient feedback during the semester. Secondly, approximately half the students state that the feedback they get helps them identify gaps in their understanding and helps them improve their learning process. Third, students are not impressed with the quality and quantity of feedback they receive in connection with exams or large assignments. This is particularly obvious for the cand.merc. students,

as less than a quarter consider the possibility of getting feedback on exams as being good. However, this is perhaps not surprising as students typically do not get individual feedback on their assignments or exam papers.[1] Finally, Figure 1 shows that there is a big divide between the two MSc programmes when it comes to feedback on exams and assignments, with the two MSc programmes being on either side of the Aarhus BSS average.

A possible explanation for ITKO scoring higher and cand.merc. lower than the BSS average on feedback is that participative learning and feedback are institutionalized in the ITKO programme. This is clear when focus is on feedback given in connection with exams. However, it is surprising that the differences between the two MSc programmes are not bigger. We propose at least two possible explanations. First, while an institutionalized participative learning and feedback design means that students get more feedback, it also increases their expectations. Students seem to think that you can never get too much feedback; actually, the more feedback you get, the more you want. Second, the participative learning and feedback design of individual courses can play a significant role in the overall evaluation of the programmes. This is discussed in more detail in relation to the teachers' comments on how they apply participative learning.

The qualitative comments highlighted in the Study Environment survey report (Jensen et al., 2014a: 40) regarding feedback in relation to exams suggest that the lack of feedback is demotivating and that students need help to improve and to learn from their mistakes:

> *I think lack of feedback, especially after an exam, is a big problem! It is automatically assumed that we are top-motivated students. And, in general, we are, but a bad exam experience and/or a poor mark without further explanation is extremely demotivating." (Student, BSS)*

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[1] In 2017, the Study Board for Economics and Business Administration at Aarhus BSS decided that feedback must be provided for all written exams. The form is left to the individual teachers responsible for the course, and can thus be individual or collective, written or oral.

Table 2. The Study Environment Study – Contact with teachers

	Aarhus BBS	ITKO	Business Intelligence	Information Management	International Business	Marketing	Strategy, Organisation and Leadership	Innovation Management	Cand.merc.
It is easy to get in contact with most teachers (Completely agree/most agree in per cent)	**58**	**60**	73	92	60	59	61	78	**67**
The teachers that I have been in contact with generally seem interested in the students (Completely agree/most agree in per cent)	**73**	**70**	100	92	84	67	68	85	**80**

Source: Study Environment 2014 Aarhus University (Jensen et al., 2014b)

In addition to feedback, the Study Environment survey included questions regarding more general interaction with teachers ('It is easy to get in contact with most teachers' and 'The teachers that I have been in contact with generally seem interested in the students'). Although it can be difficult to get in touch with teachers, teachers are seen as interested in students (see Table 2). These questions are very broad and open to interpretation of what they cover. In the focus groups we therefore explored what students understood by participative learning, interaction and dialogue.

Students' understanding of participative learning

When asked 'What is participative learning?' in the focus group interviews, the reflections of the participating students went in all directions regarding the types of, techniques for and the setting of feedback dialogues.

According to the students, productive participative learning types include workshops and role play as well as group work for large projects or case discussion sessions. Examples of unproductive interaction types include traditional lectures with Q&A sessions: 'I don't like questions if it is about guessing' one student said, while another student stated that, 'We only participate because it is embarrassing for the teacher if nobody says anything'. To be more specific, many students commented on useful

and not so useful techniques for creating dialogue. Clickers and other voting systems were seen as very productive, whereas many students saw student-teach-student sessions in particular as a waste of time. One student explained it this way:

> *Student-teach-student does not work when students present theoretical reviews. The ambitious student holds back with criticism [of other, not so ambitious students], it is a waste of time.*

Furthermore, the setting created for dialogue was mentioned to be essential, especially if the assumption for interaction is that the student comes to classes because they perceive it to give greater value than staying at home studying. Another type of comment related to the setting is the length of sessions and the need for breaks. A student summarizes the setting as an important factor:

> *Four-hour lectures are generally too extensive, and when the teacher uses a participative learning strategy, people slope off.*

The above reflections demonstrate that students recognize participative learning, if used and designed in the right way, as being productive for creating dialogue in class. In other words, these ideas for designing programmes and courses can create student activity to make feedback a natural part of the education.

Results II: Teachers want dialogue

The present analysis of teachers' understanding of participative learning is based on structured interviews conducted via e-mail. We first address why teachers find it important to create interaction and dialogue. Then, we discuss techniques that teachers have used successfully or unsuccessfully to create dialogue (at least in their understanding). Next, we focus on how to create a foundation for effective dialogue in participative learning settings and thereby feedback. We then focus on the barriers to the creation of such a foundation before, finally, discussing the criteria of success and the teachers' motivation for creating an efficient feedback culture.

Dialogue and interaction are important!

Regardless of what subjects they are teaching, all respondents consider interaction and dialogue with students to be important because it promotes student engagement, motivation, attention and ownership. In this way, interaction and dialogue are seen to have a positive impact on students' levels of performance.

Passively receiving information from lectures and PowerPoint presentations are often considered to be ineffective forms of learning. In contrast, active participation and interaction are seen as essential components of the learning process as they allow students to work with the subject matter and provide students with the opportunity to appropriate the vocabulary of the subject, i.e., to perform relative to the learning objectives. For instance, one respondent views it as important that students

'get the opportunity to formulate their understandings and misunderstandings' by engaging in dialogue with teachers and fellow students. Interaction and dialogue are seen as especially important 'in fields where there are no definite answers'.

Furthermore, dialogue and interaction give teachers valuable information about how they are performing as teachers and to adjust the content and level of their teaching to the group of students they are facing. By allowing students to use what they are being taught, interaction and dialogue facilitate the feedback process and allow teachers (and sometimes fellow students) to provide targeted feedback on what is (not) understood, where the understanding is (not) good and how students can do better. Interaction and dialogue are also seen to enable students to utilise their own knowledge and perspectives. This is especially the case in part-time programmes with students from business. However, teachers often find that it is a struggle to engage students in dialogical activities and therefore can be unsure of how they are doing as teachers.

Successful initiatives

Respondents claim to have successfully used a wide range of activities to generate interaction and dialogue in class and in virtual learning environments, thus giving students the opportunity to perform and providing teachers with something to give feedback on. Activities that respondents argue have been used successfully include simulations, case discussions, seminars, workshops, company visits, supervision of project groups, group discussions (for instance using the think/pair/share approach), online discussions, planned class discussions and discussions of previous exam assignments. For instance, one teacher asks students to present scientific papers and cases in class in order to make them familiar with what is required when later writing scientific papers and in exam situations. The teacher considers this to be a successful practice, but it is perhaps relevant to bear in mind that student-teach-student was not considered useful by students in the study panel for presentations of theoretical issues.

Other teachers stress the importance of being available for answering questions in breaks (or after class), as the teacher can follow up on these questions after the break or in the following lecture. Dialogue – whether in class or during breaks – is important for adjusting the teaching level, for instance to ensure that teachers balance the complexity of questions so that students will not find questions too difficult and not too easy either. Furthermore, some teachers provide written feedback on assignments and exams, although this is hard to practice when teaching large classes. Using 10 minutes to give individual feedback to a normal class of 60-80 students easily makes for a good long day of work.

Unsuccessful initiatives

Sometimes activities that were successful in one class turn out unsuccessful in another. When discussing why attempts to foster dialogue in interaction fail, teachers describe a variety of barriers. Many of these are related to the contextual factors, such as 'auditoriums are not suitable for dialogue' or that classes are too big. Some teachers also point to (at least some) students being immature and some who are poorly motivated and come unprepared. Some teachers have even experienced students complaining about being disturbed while on Facebook, and some respondents mention that certain students 'attend classes only sporadically'.

While dialogue and interaction are considered important, several respondents note that the current favoured model for teaching at Aarhus BSS (large classes; one final written exam) works against providing students with detailed feedback on their performance. Not least the growing number of written exams is seen as reducing the opportunity for providing feedback. Some respondents also point out that not all students take advantage of the opportunity for interaction and dialogue provided by teachers, and it is acknowledged that there will always be a group of students that do not feel comfortable participating in class. In this connection, it is also mentioned that the atmosphere differs across classes, and that the atmosphere of a particular class can either be conducive or unfavourable to students engaging in dialogue and interaction. Some teachers argue that this is because 'bachelor students are trained to be passive'. The context that this statement should be understood in was described earlier when presenting the empirical setting – Aarhus BSS. Bachelor students are often in classes of 200-350 students for lectures, which is not a setting conducive to participative learning activities.

Respondents have mixed experiences with student-teach-student activities (as do students, as we saw above). One respondent commented that 'some students are really pleased with this [activity], but the majority can't be bothered'. According to this respondent, these students have different explanations as to why they dislike this activity: the groups presenting are not prepared; that they are uncomfortable presenting in front of their peers; that it is time-consuming, and so on. The respondent speculates that these are just convenient excuses.

These reasons for low student performance levels are supplemented with many respondents suggesting that barriers could be avoided by formulating clear learning objectives: interaction should be stated as a requirement to counter the problem that 'we cannot require attendance' or that 'students want tutoring only', which underlines that participative learning requires participation. An example of a failed attempt to engage in dialogue and interaction was given by a teacher who said that 'when I addressed the class with questions and/or tried to initiate a discussion [by] allocating substantial time to work on a case study (about 45 minutes), up to a third

of the class left'. Another teacher said that, 'students are reluctant to report back to the class/whole group after short group discussions'. When simple questions are asked in class, often there is no feedback because 'students are not used to being asked and fear giving the wrong answer', which ironically ends up in a situation where 'students think they did not get enough feedback on case work'. An alternative explanation is that students perceive the questions as too simple.

The physical settings should also promote interaction and dialogue, but the setup of many classrooms is seen to favour one-way teaching with fixed-seat auditoriums, and the number of students is often too high for traditional student-teacher dialogue. Also, it is seen as an impediment that students' unwillingness to participate cannot be reflected in their grades. Teachers view these kinds of barriers as a challenge to the establishment of interaction and dialogues.

Requirements for successful dialogue

Successful participative learning occurs when students are motivated and (inter)active and their performance is aligned with clear participative learning objectives, which help students to receive and use feedback to improve their learning. For attempts to foster dialogue and interaction to be successful in improving student performance levels, engaged teachers and motivated students are required. 'Real' students are, therefore, argued to be those '[motivated] students who respond to the offer of such initiatives and work together with the teacher in an interactive manner'. In other words, some respondents equate good students with good performance. To some extent at least, blaming students for being lazy and immature can seem to be a convenient excuse for teachers rationalizing why they do not engage in interactive practices such as providing feedback.

With regard to teachers, good teachers are seen by our respondents as being experienced in teaching and having developed improvization abilities; they should also be able and 'willing to engage in such initiatives' and they should know that 'learning objectives should be expressed' along with 'sound explanations of why and how' they are 'aligned with the grading system'. In general, the key success criteria include a feedback process that 'trains students to receive feedback that will help them learn, not [just] pass the exam'. This process takes more time than classic lecturing and requires that the parties trust each other.

Student-teacher interaction – a conceptual model for improving feedback

In the preceding sections, we have discussed student and teacher perspectives on interaction, dialogue and feedback in learning settings at Aarhus BSS. From the student perspective, feedback is seen as particularly important. In fact, students' demand for feedback seems to be insatiable. According to the data from teachers, participative learning is constituted by the students' formulation of understandings and

misunderstandings, which is in alignment with the objectives of participative learning through interaction and dialogues about what was (not) understood, where (mis)understandings are found and how to improve understanding and performance. Students doing exercises and activities facilitate feedback, which can be oral or written, in- or outside the class or in breaks. Learning objectives must be operationalized to enable this feedback.

Table 3 presents a summary of our finding regarding the teachers' ideas on how to improve feedback, interaction and dialogue in a participative learning setting.

Table 3: Teachers' idea catalogue

	Goal directed practice	**Participative learning elements**	**Targeted feedback**
Facilitators	Learning objectives are operationalized to facilitate the right level of questions asked and the feedback given	Exercises (simulations, case studies, seminars, workshops) and activities (company visits, supervision of project groups, group talks, online and class discussions)	Feedback on student exercises and activities in class, in writing or in the breaks between lectures.
Barriers	When the desired level of performance is not described in a balanced way and when it is not aligned with grading	Substandard auditoriums, too large classes, low-level student participation and no grading on participation	Students and teacher are reluctant to interact resulting in non-feedback dialogue.
Key success factors	Learning objectives should be expressed explaining properly why and how they are aligned with the grading system	Motivated and inter-active-minded students	Train students to receive feedback that will help them learn

Although the above list is valuable as inspiration for the individual teacher, we think this is not enough in order to design institutionalized feedback practices. We therefore outline a model that can help design feedback practices both at the course and programme levels.

Figure 2 is based on the main insights from our analysis and key points from literature referenced earlier. It illustrates that feedback is a dialogical method for aligning

learning objectives and performance levels through a focus on performance level issues and how to solve them.

The model illustrates that providing students with targeted feedback takes its starting point in actual student activities characterized by a certain performance level seen in relation to the learning objectives for this activity (Arrow 1: Goal-directed practice).

The teacher can then evaluate to what extent the student has met the learning objectives and provide targeted feedback (Arrow 2: Targeted feedback). Feedback can be provided on the level of performance (e.g., on the level of understanding, with a focus on what is understood and what is not) and where the performance is good or could be better (e.g., where understanding is good or lacking). Feedback should also provide the student with suggestions on how to improve his/her performance. In other words, it is impossible to provide feedback without the student being an active participant in the learning process; creating shared classroom discussions is difficult and it always requires two active parties to engage in communication (Havnes et al., 2012).

Figure 2: Student – teacher interaction

Source: Inspired by Ambrose et al. (2010).

Given that feedback should be dialogical, the student can then provide the teacher with feedback (Arrow 3: Feedback on feedback), who can then evaluate whether the original feedback was successful and provide more feedback if required. The extent to which students use feedback can be evaluated once a new performance has been delivered.

The model thus illustrates that feedback involves teachers' and/or students' giving and receiving feedback (Hattie & Timperley, 2007) in a cyclical process (Nicol, 2010), both with respect to course work and exams (Hounsell et al., 2008). Ideally feedback should involve two-stage assignments where the student will use the feedback in the first stage to improve the performance and/or quality of the work for the second stage submission (Carless et al., 2011). If revision of the work is unfeasible (as will often be the case in the mass university), the feedback to the student should focus more on what to do in the future (Dysthe, 2011).

As our results showed, students are critical of certain types of activities (not least student-teach-student) and there are structural factors (large class sizes, physical layout of class room) that can make it difficult to engage students in dialogical activities. Thus, teachers have to think carefully about designing courses and activities in order to encourage student performance.

If examination is seen as part of the learning process, feedback on examinations can be relevant. This is the case in our programmes, where we have this year made it mandatory to provide feedback on all written exams while leaving the form (written or oral, individual or collective) up to the individual course responsible.

The focus on student performance means that learning objectives should be clear so that students can use them to guide their activities and so that they can be used in the feedback process. To conclude, establishing a feedback culture requires appropriate learning objectives and that both teacher and students are active.

Discussion and implications

In this paper, we have argued that both students and teachers call for more dialogue, but that modern management education faces an interaction paradox as both students and teachers are left wanting. Interaction, dialogue and feedback between students and teachers are crucial for learning and hence should take centre stage in the development of individual courses and educational programmes.

From the Study Environment survey, we know that the students want more feedback in order to clarify their understandings and misunderstandings and to get help to improve their learning process. In our student panel interviews we found that students recognize that they have to be active in order to create a participative learning setting where interaction and dialogue drive the feedback processes. However, this requires that exercises and activities are seen as productive and meaningful.

Tackling these issues is a challenge for individual teachers, who have to think carefully about how they can incorporate activities that stimulate dialogue and are seen as meaningful by students and provide opportunities for giving feedback into their teaching. Teachers can adopt learning objectives for their respective courses that define what is meaningful in the given context, where the focus is on the creation of

a participative learning atmosphere and where the objectives are operationalized to facilitate appropriate questioning and feedback. This means that the learning objectives should identify the desired level of performance and contain sound explanations of why and how this is evaluated. The performance of students relates to their ability to formulate their understandings and misunderstandings when working with exercises (simulations, case studies, seminars, workshops, etc.) and for the students who participate in activities to find them relevant (company visits, supervision of project groups, group talks, online and class discussions). It is also important that individual teachers provide feedback when students can still benefit from it to improve their performance, i.e. before the exam (cf. Ambrose et al., 2010; Hattie & Timperley, 2007; Weaver, 2006).

Dialogue and feedback is not only important for how students perform. It also impacts how teachers perform and ultimately their well-being. When dialogue is lacking in the class room, it is difficult for teachers to develop an appreciation of whether they are successful in their endeavours – are students developing the knowledge, competences and skills they are supposed to, or does the teacher need to take a different approach? It is also a source of frustration for teachers if they fail in engaging students in interaction and dialogue. Interactive, participative learning based on dialogue and feedback tends to be encouraged by university educational development teams, but can result in 'a misalignment between the responsibilities and job demands and the way institutions govern people in such roles' that has been shown to affect the well-being of teachers by creating expectations that teachers have difficulties meeting (Franco-Santos, et al., 2017: 1). That the students often do not collect the feedback on examinations, which many universities are obliged to provide, (Dysthe, 2011; Nicol, 2010; Sinclair & Cleland, 2007) can also be a source of frustration for the teachers and have a negative impact on academic well-being.

Individual teachers cannot solve the interaction paradox on their own. It is important that universities create an institutional setup that is conducive to providing feedback and fostering dialogue between students and teachers in order to stimulate student learning and facilitate academic wellbeing. In this connection, it is important for institutions to think about what can be done to encourage teachers to engage in dialogical activities such as providing feedback to students. At the Department of Management at Aarhus BSS, for instance, the system has been revised to include a teaching norm for giving feedback to students, whether on exams or during the semester. Providing feedback hence does not have to be *con amore*. This facilitates meeting the requirement for feedback on exams that was recently passed by the study board. Our results suggest that students react positively to institutionalized feedback on exams, but also that student expectations increase.

There are also challenges that are more difficult to overcome, at least in the short run, including auditoriums that are more suitable for one-way teaching, classes with

large numbers of students and limited possibilities for grading on participation. If these barriers are too high, the result is non-feedback dialogues, where dialogue is only about why students and teachers are reluctant to interact.

Teachers and universities can do a lot to improve dialogue, but there is also a literature suggesting that there are individual-level reasons on the part of students that can explain why they are not participating actively in dialogical activities, that also should be taken into account. One is that business students have become more narcissistic, with current students being part of 'Generation Me' (Twenge, 2014). Studies indicate that narcissism levels are increasing and are particularly high in business students (Twenge, et al., 2008). Students high in narcissism display 'a pervasive pattern of grandiosity, self-focus and self-importance' that is incompatible with collaborative learning techniques such as in-class, group-based instructional methods (Bergman, et al., 2010) and critical reflection (Tomkins & Ulus, 2015). Narcissistic students suffer from a range of interpersonal deficits; are likely to be hypersensitive to evaluation and potentially negative feedback; show a sense of entitlement; and have difficulty engaging in learning processes as they find it difficult to admit that others may be more knowledgeable than they are (Beck, et al., 2015; Bergman et al., 2010). Bergman et al. (2010) note that managing productive classroom discussions, presentations, debates and other learning-centred activities represent challenges for management faculty.

Another potential explanation for the interaction paradox is that typical business students, aged 18-25 years, are in a life development phase referred to as emerging adulthood (Arnett, 2000; Dachner & Polin, 2016). During this stage of development, young adults are distinctly different from mature adults demographically, cognitively, emotionally and socially (Arnett, 2000). This has implications for teaching and learning. Dachner and Polin (2016) therefore argue that management teachers should recognize that the majority of their students are in a state of transition. Among other things, teachers should take into account that the identities of emerging adult students are becoming more complex; that students are not yet intrinsically motivated to learn; have high information requirements in relation to what, why and how they want to learn; may not have sufficient work and life experience to benefit from only in-class application; and may not have a well-developed, problem-centred mindset to immediately seek to apply what is learned (Dachner & Polin, 2016).

Pedagogical initiatives at Danish universities mainly have focused on improving the skills and competences of teachers, but perhaps it would also be interesting for pedagogical units to help students develop skills for participating in dialogical learning activities and working with feedback. In this connection, it would be relevant to replicate some of the referenced studies within a Danish context. We need further re-

search to uncover if good feedback merely leads to a demand for more feedback or whether it is a question of the frequency of feedback. More research regarding what students understand by feedback and dialogue, including whether they realize when teachers are offering feedback, would also be welcome.

Dialogue between students and teachers in management education, is a shared responsibility. It requires that students are willing to engage in participatory learning activities and that teachers are able to make these meaningful. It is up to study boards and directors of studies to create institutional frameworks that are conducive to and reward dialogue. This will improve learning and make both studying and teaching more rewarding. It is our hope that the model we propose can be valuable in these discussions about dialogue and feedback between students and teachers.

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Brugbar peer feedback: Instruktion og træning, før de studerende selv skal give og modtage

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Faglig artikel, fagfællebedømt

Peer feedback er i dag en læringsaktivitet på de fleste danske universiteter og ikke uden grund. For både den, der giver, og den, der modtager, lærer noget af at arbejde med peer feedback. Men studerende skal undervises i at give og modtage brugbar peer feedback. Det viser forfatternes erfaring med at instruere og træne studerende i tekstfeedback. I denne artikel præsenteres tre indsatser til at få peer feedback til at fungere: 1) Skab faste og trygge rammer, 2) Undervis i principper for brugbar peer feedback, 3) Instruér forbilledligt i feedback ved hjælp af tekstek-sempel. Formålet er at give undervisere indsigt i, hvilken form for rammesætning og instruktion der er behov for, hvis peer feedback skal fungere som læringsaktivi-tet i forbindelse med akademisk skrivning.

Indledning

Peer feedback er blevet populær på universiteterne, og det er der flere grunde til. For det første er der de læringspotentialer, som er forbundet med, at studerende ikke bare skal modtage feedback, men også selv skal give den. Arbejdet med peer feedback kan bl.a. medføre dybere forståelse af indholdet i undervisningen og øget refleksion over de krav og kriterier, der er i fagene (Nicol, Thomson & Breslin, 2014). For det andet har universiteterne i dag fokus på *output* - altså på, at de studerende skal kunne anvende det, de lærer. Studerende skal ikke være passive modtagere af *input*, de skal være medskabere af undervisning og læring (Felten, 2014), og her er peer feedback central, fordi den skaber rum for, at studerende kan lære af hinanden. En tredje og mere praktisk grund er, at universiteterne er pressede af, at der er mange studerende og få ressourcer til, at underviserne kan give feedback – et problem, som peer feedback delvis kan være med til at løse.

I denne artikel fokuserer vi på peer feedback på tekster som middel til, at studerende kan udvikle sig som opgaveskrivere. Feedback er en vigtig forudsætning for, at studerende kan udvikle deres skriftlige akademiske færdigheder, og studerende kan rent faktisk hjælpe hinanden med at udvikle disse færdigheder via peer feedback.

Men man kan ikke uden videre slippe studerende løs og sætte dem til at give hinanden feedback - og opstilling af faste feedbackkriterier (rubrics) er ikke tilstrækkelig hjælp. Det erfarer vi som skrivevejledere i Center for Undervisningsudvikling og Digitale Medier på ARTS, Aarhus Universitet. Mange af vores studerende mangler træning i at give og modtage feedback, og den manglende træning kan stå i vejen for læringspotentialet ved peer feedback. I bedste mening sætter mange uddannelser tid af til peer feedback i undervisningsplanen, men denne tid skal studerende lære at bruge effektivt og professionelt, og det skal de lære af en forbilledlig instruktør. Én, som viser dem, hvordan man giver og modtager feedback, og som sørger for, at de får træning, før de skal klare sig selv. Så udover at de studerende skal opleve at have behov for den feedback, de modtager (motive), modtage den på et tidspunkt, hvor de har brug for den (oppurtunity), og være villige til at indarbejde den (means) (Shute, 2008) skal de altså også lære, hvordan de skal *give* den.

Det faglige ståsted for denne artikel er retorikken, som er en empirisk og normativ videnskab om produktion og reception af ytringer i deres helhed (Kock, 1997). Som skrivevejledere tager vi udgangspunkt i retorikkens didaktiske tradition for at undervise i skriftlig (og mundtlig) fremstilling ved netop at fokusere på både produktion og reception af ytringer. Rationalet er, at man bliver god til at skrive 1) af at producere skriftlige ytringer og modtage andres kritik til dem, og 2) af at læse andres skriftlige ytringer og give kritik til dem. Desuden tager vi udgangspunkt i den procesorienterede skrivepædagogik, som vandt frem i 70'rne i USA og gjorde op med skriveundervisning med et ensidigt fokus på det færdige produkt og bedømmelsen af det. Interessen var nu også på, hvordan tekster bliver til i en skriveproces, hvilke udfordringer utrænede skribenter møder, hvilken form for vejledning skribenter har brug for m.m. I den forbindelse blev feedback helt central, fordi skribenterne ikke kun skulle have en reaktion på deres færdige tekster, men også skulle have reaktioner på deres ufærdige tekster i proces.

Vores praksis med facilitering af peer feedback

Viden om studerendes kompetencer inden for peer feedback har vi fra et projekt om vejledningsformer. I dette projekt har vi udviklet vejledningsformen *skrivegruppefacilitering*. Skrivegruppefacilitering er et ekstracurriculært tilbud til kandidatstuderende, som ønsker at mødes i en skrivegruppe flere gange over en periode for at udvikle deres skrivekompetencer sammen med andre studerende. Tilbuddet går ud på, at vi mødes med skrivegruppen i to timer, hvor vi dels giver instruktion i, hvordan gruppen kan arbejde med mundtlig peer feedback i forbindelse med opgaveskrivning, dels giver gruppen mulighed for at træne det at give og modtage feedback sammen med os. Det er især i forbindelse med træningen, at vi har observeret, hvad der udfordrer studerende ved peer feedback, og det er med udgangspunkt i disse udfor-

dringer, at vi skriver denne artikel. Artiklen bygger på observationer fra ca. 40 skrive-gruppefaciliteringer (ca. 200 studerende), og det er vores mål at gøre undervisere opmærksomme på, 1) hvad der kan stå i vejen for, at studerende kan blive gode til peer feedback, 2) hvad man skal huske, hvis man vil instruere og træne studerende i peer feedback.

Fem forhindringer for, at peer feedback kan blive brugbar

I vores praksis med skrivegruppefacilitering er vi blevet opmærksomme på, at vi ikke kan tage for givet, at vores studerende bare uden videre kan give og modtage peer feedback til tekster i proces. I skrivegruppefaciliteringen sørger vi derfor for at gøre de studerende bevidste om, hvad der kan stå i vejen for, at deres peer feedback kan blive brugbar.

Den første forhindring, som de studerende skal være bevidste om, er, at de er mere vant til at *modtage* feedback end til at *give* den. Når de så pludselig skal til at give feedback, kan de komme til at blive meget optagede af deres egen præstation som feedbackgivere. Her gælder det om at tøjle sit behov for at vise alt, hvad man kan få øje på i den andens tekst, som kunne forbedres. Intet tyder på, at den form for feedback hjælper nogen til at blive bedre til at skrive. Vi ved fra forskning i skrivepro-cesser, at den feedback, man modtager, styrer ens opmærksomhed (Sommers, 1982). Hvis man modtager al mulig feedback, der peger i alle mulige retninger, kan det med stor sandsynlighed medføre, at man opgiver at bruge den, fordi man ikke kan overskue, hvor man skal ende og begynde.

Den anden forhindring handler om, at man kan have tendens til at fokusere på kun at finde fejl i andres tekster. Derfor skal man vænne sig til at se mangler i en tekst som potentialer for udvikling, og det er ikke altid nemt, hvis man selv hovedsageligt har oplevet at få udpeget fejl i sine færdigskrevne tekster. Vi ved fra skrivepædago-gikken, at brugbar feedback både skal pege på potentialer og give forbedringsfor-slag, og at det skal ske undervejs i skriveprocessen. Feedback skal med andre ord føre til, at skribenten får andres hjælp til at få øje på "what works, and what needs work" (Murray, 1968, s. 4). En del af vores studerende finder det meningsløst, at de også skal pege på det, der virker, i hinandens tekster. De er simpelthen helt uvante med at lede efter det, der fungerer godt, og vi oplever studerende, som siger, at det er spild af tid at fokusere på det. Derfor understreger vi, at man bliver god af at gå på jagt efter det gode, som det beskrives i retorikkens ældgamle praksis, imitatio-læsning (Kock, 2001). Imitatio-læsning går ud på, at man netop bliver god til at skrive af at læse og efterligne det, der virker i andres tekster. Og en skrivegruppe kan lige-frem udvikle et fælles forråd (copia) af gode indholdsaspekter og forbilledlige sprog-lige vendinger, når de læser hinandens tekster. Hvis man ikke aktivt beslutter sig for at give det positive opmærksomhed, ender man tit med at glemme det helt.

Den tredje forhindring hænger sammen med det foregående: De fleste studerende er mere vant til at modtage *summativ* feedback, altså en bedømmelse af en færdig tekst, end til at modtage *formativ* feedback, som kan hjælpe dem til at videreudvikle deres ufærdige tekst. Det kan være nemt nok for studerende at forstå – i princippet – at de ikke skal bedømme en andens tekst, men udfordringen er: Hvad skal de så? Da forskellen på formativ og summativ feedback kan være svær at definere helt klart (Taras, 2009), introducerer vi den amerikanske skrivepædagog Peter Elbows to feedbackformer: den kriteriebaserede og den læserbaserede (Elbow, 1981). Den kriteriebaserede er de studerende ofte bekendte med, for den handler om at tage stilling til, hvorvidt en andens tekst lever op til på forhånd bestemte kriterier, fx for struktur og argumentation. Den læserbaserede feedbackform er de færreste bekendte med, og derfor er de forbeholdne over for den. Læserbaseret feedback går ud på, at man giver sin læseroplevelse videre og fx svarer på spørgsmål som: Hvor får jeg noget interessant at vide? Hvor bliver jeg forvirret over noget? Hvor har jeg brug for at noget bliver uddybet? Skal studerende udvikle sig som opgaveskrivere, er denne feedbackform helt afgørende. Men mange studerende bliver meget usikre i mødet med den: De bliver i tvivl om, hvordan man formidler en læseoplevelse på en god måde, eller de bliver bange for at give en feedback, som er forkert. Det, som de studerende skal gøres opmærksomme på i den forbindelse, er, at ansvaret for, om feedback skal bruges eller ej, ligger hos feedbackmodtageren. Som feedbackgiver er man kun forpligtet til at forberede sig grundigt, målrette sin feedback og gengive sin læseroplevelse.

Den fjerde forhindring handler om de problemer, som kan opstå, hvis man ikke skelner mellem ufærdig og færdig tekst. Mange af vores studerende er meget lidt bevidste om, hvad det vil sige at være i en skriveproces, og har den opfattelse, at en tekst ikke er en rigtig tekst, før den er fuldstændig færdig. Kladder og udkast har ingen værdi, og det er pinligt at vise dem til andre. Denne opfattelse er meget uheldig, når man skal arbejde med tekstfeedback, fordi netop andres feedback kan have den effekt, at man faktisk bliver i stand til at udvikle sine kladder og udkast til færdig tekst – uden alt for mange kriser og søvnløse nætter. Linda Flower, som har forsket i kognitive processer i forbindelse med skrivning, skelner mellem det, at vi skriver til os selv for overhovedet at forstå, hvad vi selv tænker, writer-based, og det, at vi skriver til en læser, reader-based: "Good writing … is often the cognitively demanding transformation of the natural but private expressions of Writer-based thought into a structure and style adapted to the reader" (Flower, 1979, s. 20). Andres feedback kan i denne optik være lige det, studerende har brug for, når de ikke kan finde ud af, hvad de skal skrive, om de forklarer sig godt nok, hvordan de kan vise, at de også forstår et modsynspunkt osv. De studerende skal med andre ord overvinde en modvilje mod at vise deres ufærdige tekster til andre. Derfor er det nødvendigt at skabe

tryghed i skrivegruppen, så de ikke behøver at være nervøse for at tabe ansigt eller blive nedgjort.

Den femte forhindring handler om at skelne mellem globale og lokale tekstkvaliteter. Man kan have tendens til at beskæftige sig med formuleringer, kommasætning og slåfejl (det lokale) i en tekst, som i virkeligheden har meget mere overordnede problematikker (det globale) som manglende fokus, haltende argumentation eller uklart formål. Det lokale er ganske enkelt lettere at få øje på. Men i skrivegruppen skal de studerende lære at skelne mellem brugbar feedback og korrekturlæsning. Hver ting til sin tid. Det er forståeligt, at nogle studerende kan have svært ved at se bort fra manglende kommentarer og fejl i kildehenvisninger. Men disse studerende skal blive opmærksomme på, at det er tilladt at sætte perfektionisten lidt på pause. Det er som regel spild af tid at rette stave- og kommafejl i en meget ufærdig tekst, som garanteret skal skrives om flere gange. Behovet hos skribenten er som regel at få skrivegruppens feedback til at skrive noget, der giver mening for flere end vedkommende selv.

Den gode nyhed: Vejen til brugbar peer feedback er ikke lang

Det er altså forskellige forhindringer for brugbar peer feedback. Men heldigvis kan studerende hurtigt blive dygtige feedbackgivere og -modtagere. Nedenfor beskriver vi, hvad vi arbejder med i en skrivegruppefacilitering, som har til formål at instruere studerende i principperne for brugbar feedback og at give dem mulighed for at træne peer feedback. En sådan facilitering tager to timer, hvorefter de studerende naturligvis træner videre på egen hånd i deres skrivegruppe.

Hvis man som underviser vil instruere og træne sine studerende, inden man slipper dem løs til peer feedback, anbefaler vi, at man gør tre indsatser:

1) Skab faste og trygge rammer

De fleste studerende har blandede erfaringer med feedback. Mange mener, at de ikke kan bruge andre studerendes feedback til ret meget, og de er ikke villige til at vise deres ufærdige tekster fulde af fejl frem til nogen. Det skal vi som undervisere tage alvorligt og tale højt om. De studerende skal forstå, at dårlige erfaringer med feedback sjældent er forbundet med medstuderendes manglende evner som feedbackgivere, men med dårlige eller manglende rammer for feedbacken. De studerende skal også forstå, at de selv skal gøre en aktiv indsats for at opbygge respekt og tillid i gruppen, og at underviseren ret autoritativt vil styre, præcis hvad de skal tale om, hvad de skal aftale, og hvordan de skal arbejde.

En skrivegruppe består i vores optik optimalt af 4 studerende, der fast arbejder sammen over en længere periode. Ved første møde i gruppen er det afgørende, at

de får mulighed for at præsentere sig for hinanden, fx ved at de hver især på to minutter svarer på de samme spørgsmål efter tur:

- Hvad skal jeg skrive opgave om?

- Hvorfor vil jeg gerne skrive om det?

- Hvilke ambitioner har jeg?

- Hvad plejer at gå godt i mine skriveprocesser?

- Hvad plejer at være svært for mig?

- Hvilke erfaringer har jeg med feedback?

- Hvad vil jeg gerne have ud af at arbejde med feedback i gruppen?

Det er betydningsfuldt, at rammerne for samarbejdet fastsættes tydeligt af underviseren. Normalt er vi fortalere for at inddrage studerende i at sætte rammerne for vores undervisning, men når det gælder rammerne for peer feedback, så optræder vi bevidst meget styrende. Vi beder de studerende om at prøve nogle meget faste rammer af, og vi opfordrer dem til at tro på, at disse faste rammer er vigtige for, at samarbejdet kan blive forudsigeligt, professionelt og effektivt. Man er i en sårbar situation, når man modtager feedback på noget, man har skrevet. Derfor er det vigtigt med faste rammer (Pædagogisk Center Samfundsvidenskab, 2013). I sin omfattende undersøgelse af den eksisterende forskning i formativ feedback beskriver Valerie J. Shute det sådan: "The premise underlying most research conducted in this area is that good feedback can significantly improve learning processes and outcomes, if delivered correctly. Those three words – 'if delivered correctly' – constitute the crux of this review" (Shute, 2008, s. 154). Det er altså ikke bare vigtigt, hvad feedbacken skal handle om, men i høj grad også, hvordan den bliver leveret. Rammerne skal med andre ord ligge meget fast.

Vores studerende skal have etableret faste indbyrdes aftaler om:

- Hvor ofte de skal mødes, og vi anbefaler hver anden uge

- Hvor længe møderne skal vare, og vi anbefaler to timer

- Hvor meget tid de skal bruge på at forberede sig, og vi anbefaler to timer

- Hvor meget tekst de kan sende til hinanden, og vi anbefaler maks. tre sider

- Hvornår der er deadline for at sende teksterne til hinanden, og vi anbefaler min. 24 timer inden mødet

- Hvornår det er tilladt at hyggesnakke, og vi anbefaler enten før eller efter mødet i skrivegruppen

2) Undervis i principper for brugbar peer feedback

Principper for brugbar feedback skal underviseren gennemgå grundigt. De studerende skal blive opmærksomme på, at de har opfattelser og fordomme, som kan stå i vejen for, at de kan få udbytte af at give og modtage peer feedback. Nogle af principperne kan virke banale, og som underviser kan man have lyst til at springe dem over, fordi man ikke vil tale ned til de studerende. Vores erfaring er dog, at studerende ikke har lært at arbejde systematisk med feedback, og at de har brug for, at vi som undervisere fastlægger klare og til tider nærmest indlysende regler for selve feedbacken. Muligvis synes de studerende også, at principperne lyder banale, men den holdning forsvinder som regel, når de skal træne i praksis.

Det har studerende brug for at få at vide, når de skal instrueres i feedback:

Overordnede principper

1. Du skal træne for at blive god til at give og modtage feedback. Som studerende skal I hjælpe hinanden med at blive bedre i grupperne, og derfor skal I altid huske også at give feedback til den feedback, I har modtaget, dvs. tale om, hvilken feedback der er mest brugbar.

2. Feedback skal altid forberedes hjemmefra, så den bliver målrettet og gennemtænkt.

3. I arbejder med ufærdige tekster – tekster, der er ved at blive til. Vis respekt ved altid at opføre jer anerkendende og konstruktivt.

Når du giver feedback, skal du:

1. Lede efter potentialer i teksten og prøve at komme med konkrete forslag til, hvad skribenten *kunne* gøre for at komme videre.

2. Prioritere din feedback. Feedbackmodtagere kan ikke håndtere alle mulige kommentarer i alle mulige retninger.

3. Være bevidst om globale og lokale tekstkvaliteter, og give feedback der passer til tekstens status: ufærdig, halvfærdig eller tæt på færdig.

4. Koncentrere din feedback om det globale før det lokale. Det globale har at gøre med: fokus, formål, genre, struktur, funktion af afsnit o.l. Det lokale har at gøre med formuleringer, ordvalg, stavning, kommatering o.l.

5. Begynde din feedback med at pege på noget, der fungerer godt. Fremhæv i det hele taget potentialer i teksten. Giv forbedringsforslag til det, der fungerer mindre godt, hvis du kan.

6. Huske at være konkret: Din feedback må ikke være intetsigende à la: "Jeg synes, at din tekst er spændende". Feedbacken skal have substans à la: "I linje 7

– 13 på s. 3 skriver du … det er interessant, fordi…". Peg på det, du kommenterer.

7. Stå ved din feedback. Lad dig ikke påvirke af, hvad de andre feedbackgivere siger – forskellige feedbackgivere må gerne være uenige. Feedbackmodtagere lærer af at opdage, at teksten bliver opfattet forskelligt af forskellige læsere. Det er måske tegn på, at noget skal præciseres.

8. Ikke stille spørgsmål til feedbackmodtageren, men i stedet fortælle, hvad du blev i tvivl om, da du læste teksten

9. Huske at du *ikke* er til eksamen i feedbackgivning. Det handler ikke om at vise, hvor dygtig du er til at finde *alle mulige* små og store potentialer i en tekst og komme med alverdens konstruktive forslag. Det handler om at hjælpe forfatteren med det, der er behov for p.t.

10. Ikke dømme, om en tekst er god eller dårlig; du skal hjælpe teksten videre. Det gør du bedst ved at gengive din læseroplevelse. Fx ved hjælp af sætninger som disse:

- "Jeg blev meget interesseret, da jeg læste om …, fordi …"
- "Jeg blev overbevist om …, da jeg læste …, fordi …"
- "Jeg fik lige præcis de oplysninger, jeg havde brug for, i afsnit …"
- "Jeg kan ikke forstå …, fordi …"
- "Jeg kunne tænke mig at få uddybet …, fordi …"
- "For mig var … forvirrende, fordi …"
- "For mig var det overflødigt at læse om …, fordi"
- "Jeg blev pludselig ukoncentreret, fordi …"
- "Jeg opfattede det sådan, at det, teksten overordnet vil, er …"

Når du modtager feedback, skal du:

1. Fortælle på forhånd, hvilken form for feedback du har brug for, fx i et følgebrev.

2. Have din tekst foran dig, lytte og tage noter.

3. Tie stille. Du skal ikke forklare eller forsvare dig, når du modtager feedback. I skal ikke diskutere eller komme til enighed.

4. Ikke dunke dig selv i hovedet, når du får en feedback, som på overfladen virker indlysende. Det er nemmere at hjælpe andres tekster videre end at hjælpe sin egen tekst videre.

5. Tage ansvaret for din egen tekst. Du skal tage imod al den feedback, du kan få, men du er ikke forpligtet til at bruge den i din tekst.

6. Vente med at tage stilling til den feedback, du har fået, til efter mødet er slut, og du kan gå i gang med at omskrive din tekst.

7. Give feedback på feedbacken ved at sige tak og fortælle, hvilken del af feedbacken der var særlig brugbar for dig.

3) Instruér forbilledligt i feedback ved hjælp af teksteksempel

Det er ikke svært at forstå principper for feedback i teorien. Men for de fleste studerende er det vanskeligt at udføre principperne i praksis. Grundene til det har vi skitseret tidligere i artiklen. Få skelner fx bevidst mellem ufærdig og færdig tekst, når det gælder den helt konkrete peer feedback. De har svært ved at lade være med at bedømme, også selvom principperne for feedback dikterer noget andet. De er uerfarne feedback*givere*, som skal lære en feedbackpraksis, der ikke er naturlig for dem. Derfor må vi som undervisere opføre os forbilledligt. Vi skal ikke kun opstille kriterier for feedback, vi skal *vise*, præcis hvilken form for feedback, de skal arbejde med, hvordan den udføres, og hvordan man helt konkret skal formulere sig. I vores projekt har vi som nævnt arbejdet med mundtlig fremlæggelse af feedback til tekster, men pointerne i det følgende gælder principielt for levering af både skriftlig og mundtlig feedback. I skrivegruppefacilitering arbejder vi med det forbilledlige ved at bruge tid på, at de studerende læser et konkret teksteksempel, som er skrevet af en anonym studerende, som ikke er med i skrivegruppen. De studerende forbereder peer feedback til eksemplet og fremlægger deres feedback for gruppen. Undervejs når de fremlægger deres feedback, kommenterer vi dens brugbarhed og kommer med gode eksempler på, hvad man med fordel kunne sige i sin feedback, og hvordan man kunne levere det. For at illustrere det forbilledlige viser vi nedenfor et konkret teksteksempel, som vi ofte har anvendt, samt tilknyttede feedbackkommentarer. Eksemplet udmærker sig ved at være kort og meget ufærdigt, hvilket gør det særdeles egnet til træning i at give formativ feedback.

Følgebrev til feedback:

Kære Skrivegruppe

Jeg er gået i gang med at skrive min analyse, men et eller andet er helt galt. Hvad er det jeg prøver at få frem? Hvad er det jeg gør galt?

Hilsen Bolette

Tekst:

Under interviewet bliver Birthe i tvivl om, om hun giver sin datter for stort et ansvar ved ikke at tale med hende om seksualitet og porno. Jeg vil gerne have

uddybet hvori hendes tvivl består. Jeg starter med at opsummerer hvad det er jeg hører hende sige for på den måde at åbne til de refleksioner Birthe har omkring det at tale om seksualitet med sin datter.

E:[] det virker som om der er en meget klar grænse...hvor hun giver udtryk for hvad hun vil være med til...hvor du bare...altså du ville aldrig gå over den? Og så kommer der så nogen refleksioner over .."giver jeg hende nu for stort et ansvar"...[]

Af Birthes svar kan jeg høre at det er rigtigt beskrevet, i alt fald begynder hun at fortælle.

B ja...ja!...det tror jeg også...og så tænker jeg måske den dag hvor hun så får en kæreste ikke? ..men der tænker jeg den dag kan det jo også være for sent kan man sige...der kan hun have nået og...rodet rundt inden...at der ville det...der ville det falde naturligt på en anden måde ikke?...og sige ..hvad skal du op til lægen..og...få kigget på noget prævention...hvor jeg tænker at det ville være meget overskridende på en eller anden måde og sige det nu ikk´?...hvor det ikke er mit indtryk...at der er gang i noget med drenge...nej..[]

Birthes tvivl handler om, om hun ville være for grænseoverskridende, hvis hun vælger at tale om seksualitet nu, hvor hun ikke har nogen fornemmelse, af at der overhovedet er gang i noget med drenge. Birthe indgår her nærmest i en forhandling med sig selv, om hvorvidt det er rigtigt at hun ikke taler med sin datter om seksualitet nu. Hun vipper således mellem at synes at hun burde sige noget, fordi hun giver sin datter for stort et ansvar. Over til at det ville være overskridende at gøre det nu. Hun ender med at beslutte at det ikke er nu, at det er noget med den rigtige timing. Det skal være relevant for den unge og det definerer hun som når hendes datter "har gang i noget med drenge".

Umiddelbart kan eksemplet afstedkomme feedback som: "Jeg forstår det overhovedet ikke", "det har ikke ret meget med en analyse at gøre" eller "du har ikke styr på nutids-r ". Men den form for feedback har Bolette ikke brug for. Hun ved udmærket godt, at noget er galt, så hun har brug for at få hjælp til at komme videre. Og man kan som underviser illustrere, hvordan det kan ske, ved fx at give denne type feedback:

- Jeg bliver interesseret, når jeg læser, at det handler om, hvilke refleksioner forældre egentlig har mht. unge og seksualitet. Det virker relevant, at nogen undersøger det på vores uddannelse.

- Jeg forstår det sådan, at du gerne vil i dybden med en tvivl eller et dilemma, som din interviewperson oplever. Men jeg kommer alligevel i tvivl, for jeg forstår ikke helt, hvad der er vigtigt i analysen. Jeg veksler mellem at tænke, at afsnittet handler om ansvar, om tvivl, om at være grænseoverskridende, om

at forhandle med sig selv. Jeg kunne tænke mig, at du uddybede, hvad udtalelsen egentlig er et eksempel på.

- Jeg mangler oplysninger om, hvordan analysen skal hjælpe dig til at svare på problemformuleringen. Du kunne fx indlede afsnittet ved at skrive noget i retning af: "I denne analyse undersøger jeg X ved at anvende begrebet Y for at … "

- Jeg kan se, at du er i gang med at skrive analyse, fordi du gengiver et citat, som du efterbehandler. Så langt så godt. Dog er din efterbehandling meget genfortællende. Så jeg savner, at du viser, hvordan du ved hjælp af begreber fra vores fag finder ud af noget i analysen, som ikke er til at få øje på for det blotte øje.

- For mig er det unødvendigt, at du gengiver, præcis hvad du selv sagde for at få Birthe til at tale. Jeg er interesseret i, hvad Birthe sagde, og i din analyse af det. Så jeg synes, at du bare kan slette E:[] … ansvar … []".

Der er ingen tvivl om, at Bolettes tekst er meget mangelfuld, og det taler vi selvfølgelig med skrivegruppen om. Der er ikke tale om, at en skrivegruppe skal være en roseklub. Bolettes tekst har alle mulige mangler, men skrivegruppens opgave er ikke at tale længe om dem. Skrivegruppen skal i stedet bruge tid på at formidle deres læseroplevelse og på at være konstruktiv, så Bolette kan komme i gang med at forbedre sin tekst. Det er med gennemgangen af teksteksemplet, at vores studerende forstår og oplever i praksis, hvorfor de skal beskæftige sig med de principper for feedback, som kan virke banale i teorien.

Sammenfatning

Vi er store fortalere for peer feedback som middel til, at studerende udvikler sig som opgaveskrivere, ikke mindst fordi vores studerende melder tilbage til os, at arbejdet i skrivegrupperne øger kvaliteten af deres opgaver og letter deres skriveprocesser. Vi er opmærksomme på, at vi som skrivevejledere har en særlig position, fordi vi mødes med studerende, som selv opsøger vores tilbud, og som er meget motiverede for at lære at give og modtage feedback. Vi oplever fx ikke problemer med, at feedback gives mundtligt, selvom vi er klar over, at forskning i feedback tyder på, at skriftlig feedback er mere effektiv (Shute, 2008). Vi har tid til at instruere og træne, og vi oplever, at den tid er givet godt ud - selv med vores meget motiverede studerende. På den baggrund er det vores anbefaling, at man sætter tid af til instruktion og træning, hvis man fx vil lade peer feedback være en aktivitet, som de studerende skal udføre selvstændigt uden for den egentlige undervisning for at dokumentere, at de er studieaktive. I den forbindelse kan undervisere formulere de kvalitetskriterier i rubrics, som de studerende skal give hinanden feedback ud fra. Men som det er fremgået, så er det vores erfaring, at det ikke er nok. Man kan ikke gå ud fra, at alle

studerende ved, hvordan de skal arbejde med peer feedback. Derfor har vi her i artiklen opfordret til, at en forbilledlig underviser bruger tid på at skabe trygge og faste rammer for peer feedback, på at gennemgå principper for feedback, og på at vise de studerende ikke bare hvad feedbacken skal handle om, men også hvordan den helt konkret skal gives. Om det foregår i to sammenhængende timer eller i løbet af de første undervisningsgange i et forløb er ikke afgørende. Det afgørende er, at man *ikke* går ud fra, at alle studerende pr. automatik kan finde ud af at give og modtage peer feedback.

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Barrierer for det gode ph.d.-forløb og udvikling af et cafétilbud i biblioteket

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Faglig artikel, fagfællebedømt

Denne artikel formidler et projekt, der blev gennemført i Syddansk Universitetsbibliotek for at udvikle et støttetilbud til ph.d.-studerende. Projektet skulle dels afdække interessen, dels udvikle tilbuddets nærmere form og indhold. En bagvedliggende tanke var, at tilbuddet – for at blive en succes – skulle adressere de barrierer, ph.d.-studerende oplever i deres ph.d.-forløb.

Personlige interviews med ph.d.-studerende pegede på dårlig vejlederrelation, undervisningspres og manglende kendskab til egen organisation og rettigheder som nogle af de oplevede barrierer. Konsekvenserne var bl.a. oplevede dårlige kompetencer i tidsstyring og informationssøgning samt, på den psykosociale side, ensomhed, faglig usikkerhed og dårlig trivsel.

På den baggrund har biblioteket udviklet et cafétilbud med det formål at understøtte fagligt og socialt netværk blandt ph.d.-studerende på tværs af fagområder.

Det er forventningen, at projektets metode og resultater kan være til inspiration for andre, der er i berøring med studerende og ph.d.-studerende, f.eks. gennem vejledning eller andre supportfunktioner på videregående uddannelsesinstitutioner.

Introduktion

Biblioteket er jævnligt i kontakt med ph.d.-studerende, som skal have hjælp til litteratursøgning, på kurser i ansvarlig videnskabelig praksis mv. Ofte fører disse møder til længere samtaler, der bevæger sig langt ud over det oprindelige emne, og som antyder en grundlæggende stor tillid ikke bare til biblioteket som institution, men også til de enkelte medarbejdere. Samtidig har flere medarbejdere i biblioteket, herunder forfatterne til denne artikel, personlige erfaringer fra eget ph.d.-forløb. Ad hoc-observationer fra disse to 'platforme' satte gang i projektet: Hvordan kan biblioteket understøtte et godt ph.d.-forløb? Kan biblioteket bidrage til at reducere ensomhedsfølelsen og samtidig adressere nogle af de udfordringer, ph.d.-studerende møder, inden for rammerne af bibliotekets kerneydelser? Ideen om at lancere en ph.d.-café opstod, og projektet blev født. Ph.d.-caféen var fra starten tænkt som en platform til netværk og metafaglig refleksion, og det var en hovedtanke, at aktiviteten skulle

supplere – ikke konkurrere med – det faglige uddannelsesforløb, der i forvejen ligger i et ph.d.-studium.

Flere end nogensinde er indskrevet som ph.d.-studerende på danske uddannelses-institutioner (Danske Universiteter, 2017). Ph.d.-graden er den højeste formaliserede akademiske uddannelse, man kan opnå i det danske uddannelsessystem. Et ph.d.-studie er berammet til tre år, og inden for den tidsramme skal den ph.d.-studerende kvalificere sig til højeste faglige niveau ved at fordybe sig fagligt og producere en afhandling på videnskabeligt niveau. I ph.d.-studiet indgår også et mere formelt ud-dannelsesforløb gennem kurser og miljøskifte samt pligt til at påtage sig undervis-nings- og/eller formidlingsopgaver, tilsammen svarende til et års arbejde. Elemen-terne i ph.d.-studiet er regulerede gennem ph.d.-bekendtgørelsen (Uddannelses- og Forskningsministeriet, 2013).

Omkring hver femte fuldfører ikke ph.d.-studiet, men falder fra undervejs, inden af-handlingen skal indleveres (Uddannelses- og Forskningsministeriet, 2015). En tidlige-re national undersøgelse af årsager til frafald peger særligt på vejleder og et stærkt fagligt miljø som vigtige faktorer for at gennemføre (Universitets- og Bygningsstyrel-sen, 2007). Meget tyder dog på, at dette ikke er hele forklaringen. Den hidtil mest omfattende kvalitetsundersøgelse på området viser, at mange særligt inden for sam-fundsvidenskab og humaniora føler sig ofte ensomme på arbejdspladsen og alene med deres projekt uden den nødvendige sparring (hhv. 18% og 22%) (Herrmann, Wichmann-Hansen & Jensen, 2014).

Universitetsbiblioteker er videninstitutioner, der servicerer ansatte og studerende med faglige materialer og ydelser, der kan indgå i universitetets videnskabelige pro-duktion og undervisning. Universitetsbibliotekets traditionelle kerneydelse er at stille materialer (i biblioteksverdenen kaldet 'informationsressourcer') til rådighed for stu-derende og ansatte og bidrage til uddannelsen af bibliotekets brugere i at finde og udvælge blandt de tilgængelige informationer og materialer (i biblioteksterminologi: 'informationskompetence'). Derudover bidrager biblioteket med en række special-ydelser målrettet bestemte brugergrupper, f.eks. systematiske reviews eller biblio-metriske analyser (forskere) eller undervisning i referencehåndtering og opgave-skrivning (studerende). Universitetsbiblioteket er således en grundlæggende støtte-funktion for både forskning og uddannelse. Spørgsmålet er, om biblioteket også bør udfolde sig som understøttende funktion på mere 'bløde' trivselsparametre. I givet fald bør biblioteket utvivlsomt kommunikere hensigten meget tydeligt og være op-mærksom på at undgå konkurrence med andre tiltag.

Ph.d.-studerende er under uddannelse til forskere og befinder sig i overgangen mel-lem bibliotekets store klassiske brugergrupper – de indskrevne bachelor- og kandi-datstuderende og 'forskningen'. Ph.d.-studerende er i et akademisk dannelsesforløb, hvor de dels skal lære at mestre forskningen som disciplin, dels skal finde deres pro-

fessionelle og personlige arbejdsidentitet. Som ph.d.-studerende er man ofte også rollemodel for universitetets yngre studerende, og man indgår som en væsentlig del af fødekæden for universitetets næste generation af forskere og undervisere. Præcis denne overgangsposition gør ph.d.-studerende til en særligt interessant målgruppe for universitetsbiblioteket. Samtidig viser en tidligere undersøgelse af ph.d.-studerendes informationskompetencer, at universitetsbiblioteker med fordel kan tilbyde faciliteter specifikt for netop ph.d.-studerende, og at bibliotekerne generelt bør have mere fokus på denne brugergruppe (Drachen, Larsen, Gullbekk, Westbye & Lach, 2011). Udover de typiske kurser i informationssøgning og andre redskaber kan biblioteket via sin særlige position på universitetet fungere som en form for helle i hverdagen. Til arrangementer på biblioteket skal de ph.d.-studerende ikke stå til ansvar over for vejleder og institut, men kan mødes mere frit og på tværs af fag. Derfor er det også oplagt, at biblioteket faciliterer forskellige former for oplæg og workshops, som kan understøtte ph.d.-studerende både i forhold til trivsel og i forhold til arbejdet med deres ph.d.-projekt. Netop pga. deres særlige overgangsstatus benytter ph.d.-studerende sig typisk ikke af den traditionelle studievejledning, som er rettet mod BA- og kandidatstuderende. Samtidig har biblioteket en personalegruppe, som selv har erfaring med forskeruddannelsesforløb, og som derfor kan tilbyde en forståelse for de overordnede problemstillinger, som de ph.d.-studerende kan møde undervejs.

Ph.d.-studerende går ind i et ph.d.-forløb af mange årsager. For de fleste vejer interessen for at forske og karrieremuligheder tungt (Uddannelses- og Forskningsministeriet, 2017b; 2017a; Herrmann, Wichmann-Hansen & Jensen, 2014). Efter Globaliseringsaftalen i 2006 kom der en markant stigning i optaget på landets universiteter (optaget steg fra 1.210 nye ph.d.-studerende i 2003 til 2.628 nye indskrevne i 2010, en stigning på 217%). Optaget er senere stagneret lidt (2.477 blev optaget i 2014 (Danmarks Statistiks ph.d.-register; Uddannelses- og Forskningsministeriet, 2017b)). Uanset stagnationen er der i dag langt flere ph.d.-studerende på danske universiteter end nogensinde før. Dette giver udfordringer både for de faglige miljøer, der skal rumme de ph.d.-studerende, for ph.d.-skolerne, der skal administrere ph.d.-uddannelsen, og for servicefunktioner rundt om på universiteterne, der på forskellig vis støtter op om ph.d.-forløbet, eksempelvis pædagogiske enheder, it-afdelinger, bibliotek og HR.

I modsætning til f.eks. i USA, hvor frafaldet er på over fyrre procent (Gardner & Mendoza, 2010), er frafaldet på danske ph.d.-uddannelser forholdsvis lille, også set over den periode, hvor tilgangen for alvor steg. Udgangspunktet for denne artikel og projektet bag er derfor heller ikke primært, hvor mange ph.d.-studerende der kommer igennem et ph.d.-forløb, men hvordan de kommer igennem, og hvordan biblioteket kan hjælpe dem bedre igennem.

Hvad er barriererne for et godt ph.d.-forløb set med de ph.d.-studerendes egne øjne? Hvordan kan biblioteket byde ind? Med disse forhold kortlagt vil det være muligt at udvikle et servicetilbud til ph.d.-studerende, som opfylder et reelt oplevet behov, dvs. et servicetilbud, som ph.d.-studerende både vil finde relevant, som de også i praksis vil benytte sig af, og som potentielt kan medvirke til at skabe bedre ph.d.-forløb.

I det følgende præsenterer vi fremgangsmåde for og hovedresultater af det udviklingsprojekt, vi har gennemført i regi af biblioteket for at undersøge og udvikle café-tilbuddet. Derefter beskrives og diskuteres det cafétilbud, der er realiseret på baggrund af projektet.

Bibliotekets udviklingsprojekt

Projektet trækker på tankegangen i new product development-litteraturen, hvor brugerinddragelse ses som en kritisk succesfaktor (Cooper & Kleinschmidt, 1995; Ernst, 2002). Her er filosofien dels, at et nyt produkt (herunder også en serviceydelse) må opfylde et behov i målgruppen, dels at man som led i produktudviklingen må søge indsigt i og inddrage brugernes behov, erfaringer og forventninger.

Projektet har fulgt udviklingsmodellen i figur 1. Ideen er kvalificeret ved at gennemføre en interviewundersøgelse lokalt på Syddansk Universitet (SDU). Med udgangspunkt i viden om de ph.d.-studerendes oplevede barrierer for et godt ph.d.-forløb har vi efterfølgende udviklet det konkrete tiltag. Konceptet mht. form, frekvens og rammer i øvrigt baserer sig også direkte på de input, vi har fået fra de interviewede ph.d.-studerende. Endelig er ph.d.-caféen implementeret.

Sideløbende er der også gennemført en rundspørge med andre universitetsbiblioteker, da vi ønskede at inddrage eventuelle erfaringer med lignende tiltag. Denne af-rapporteres ikke her, da erfaringerne med lignende tiltag viste sig meget begrænsede.
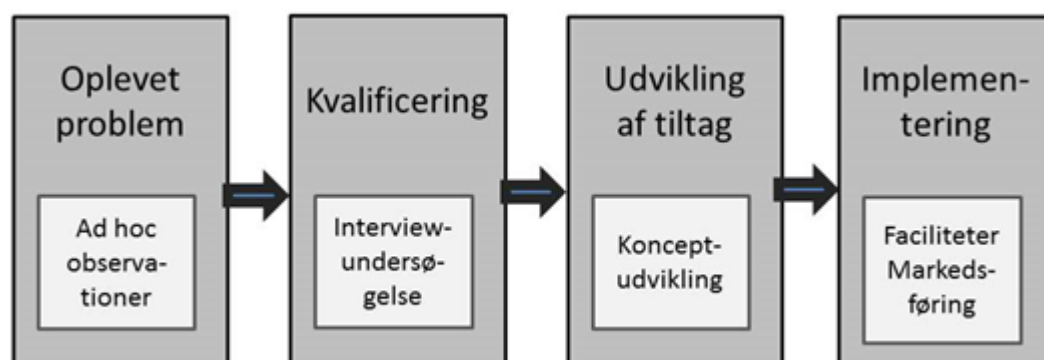
Figur 1. Udviklingsmodel

Interviewundersøgelsen

Som led i udviklingen af cafetilbuddet gennemførte vi semi-strukturerede interviews med ph.d.-studerende indskrevet ved SDU. Formålet med undersøgelsen var dels at få dybere indsigt i danske ph.d.-studerendes oplevede barrierer for et godt ph.d.-forløb for at kunne adressere disse i et kommende organiseret tilbud, dels at kvalificere tilbuddets nærmere form og indhold. Første del af interviewet (oplevede barrierer for ph.d.-forløbet) blev gennemført med inspiration fra means-end teori og laddering.

Means-end teori og laddering

Means-end teori har udgangspunkt i kognitiv psykologi og beskriver på et individuelt plan, hvordan en person mentalt kobler opfattede egenskaber ved et produkt eller en situation til livsværdier gennem opfattede selvrelevante konsekvenser (Gutman, 1982; 1997; Orsingher, Marzocchi & Valentini, 2011). Teorien kan dels tages som udtryk for, hvordan værdier fungerer som abstrakte motiver for bestemte forbrugsvalg, dels bruges til at vise hvordan forbrugsrelateret viden er organiseret i den menneskelige hukommelse. Laddering er den specifikke interview- og analysemetode, der er knyttet til teorien, og hvor man gennem semistrukturerede, hierarkiske spørgsmål afdækker interviewpersonens 'associationskæder' (fra egenskaber over konsekvenser til værdier). I den efterfølgende analyse indholdskodes elementerne, og deres overordnede temaer og forbindelser præsenteres sluttelig i grafiske kort, normalt over grupper af interviewpersoner (kaldet hierarkiske værdikort; Miles & Rowe, 2004).

Baggrunden for at bruge means-end teori og laddering i denne sammenhæng er dels, at teorien giver en teoretisk ramme både for at forstå barriererne for et godt ph.d.-forløb set fra den ph.d.-studerende selv (gennem oplevede selvrelevante konsekvenser og evt. uindfriede livsværdier), dels at interviewmetoden giver mulighed for at opnå og præsentere dybdegående indsigt på en relativt effektiv måde i modsætning til klassiske kvalitative undersøgelsesmetoder, der typisk er meget tidskrævende at gennemføre.

Interviewpersoner

Interviewundersøgelsen blev gennemført med ph.d.-studerende på de fakulteter på SDU, hvor der ikke i forvejen er fungerende ph.d.-klubber[1]. I alt 12 personer blev interviewet, fordelt med fire fra hhv. det samfundsvidenskabelige fakultet, det humanistiske fakultet og det tekniske fakultet. Alle var i anden halvdel af deres ph.d.-

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[1] Ph.d.-klubberne er lokalt drevne studenterforeninger, der afholder regelmæssige aktiviteter også med henblik på at fremme sociale relationer. Disse ønskede vi ikke at komme til at sende signaler om at ville konkurrere med.

studie. Interviewpersonerne blev udvalgt fra navnelister, som vi modtog fra fakulteternes ph.d.-skoler eller forskerstøtteenhed. Udvælgelsen skete tilfældigt (efter alfabetet) under hensyn til spredning på køn og institutter under fakulteterne. To afslog deltagelse ved første kontakt, begge med henvisning til manglende tid. I disse tilfælde blev nye interviewpersoner rekrutteret. Interviewene blev af praktiske årsager gennemført på dansk. Der blev derfor udelukkende rekrutteret blandt dansktalende ph.d.-studerende.

Alle interviewpersoner har frivilligt givet tilsagn om deltagelse og har frivilligt givet tilladelse til at videregive de indhentede informationer i anonymiseret form.

Interview og analyse

I første del af interviewet blev interviewpersonerne bedt om at nævne de forhold, som de mente, havde påvirket deres ph.d.-forløb. For hvert forhold blev der derpå spurgt ind til oplevede konsekvenser og til, hvordan forholdet – gennem de oplevede konsekvenser – havde påvirket interviewpersonens mere overordnede livsværdier. Forbindelsen fra konkrete forhold ved ph.d.-studiet over oplevede konsekvenser og til værdier definerer en 'værdikæde'. Denne interviewteknik giver brugerindsigt 'i dybden' og afdækker også årsager til, at bestemte forhold opleves som fremmere eller hæmmere af ph.d.-forløbet.

I anden del blev deltagerne forelagt ideen om en café-aktivitet for ph.d.-studerende og bedt om at forholde sig til grundideen, målgruppe, frekvens, form og indhold.

Første del blev anvendt til at få indsigt i barrierer for det gode ph.d.-forløb for at kunne uddrage konkrete ideer til emner, der med fordel kan adresseres i en ph.d.-café. Anden del fungerede som en åben samtale, som havde til formål at vurdere interessen for ideen om café-aktiviteter for ph.d.-studerende og indholdsmæssig/praktisk kvalificering af samme.

Alle interviews blev gennemført af to personer fra projektgruppen, med én som gennemgående interviewer, og en som notattager. I noterne blev nævnte egenskaber, konsekvenser og værdier registreret i et skema, der også viste deres indbyrdes nævnte forbindelser. Data blev efterfølgende for hver interviewperson kategoriseret i hhv. egenskaber, konsekvenser og værdier, indholdskodet i mere generelle kategorier, og registreret med deres italesatte forbindelser. Derpå blev 'associationskæderne' præsenteret visuelt i grafiske kort, ét pr interviewperson. Kortene blev udarbejdet af projektgruppen og er efterfølgende individuelt blevet valideret af hver enkelt interviewperson. Kortene fremgår af bilag 1.[2]

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[2] Nærmere oplysninger om interviewundersøgelsens metode og resultater kan rekvireres ved henvendelse til forfatterne.

Resultater: Barrierer for et godt ph.d.-forløb

En lang række forhold viste sig som barrierer for et godt forløb, enten ved at de blev nævnt direkte som hæmmere af ph.d.-forløbet eller ved, at de oplevede konsekvenser viste sig at være negative i det videre interview.

Langt de fleste havde både gode og dårlige ting at fortælle om deres ph.d.-forløb (en enkelt havde kun positive oplevelser; en enkelt nævnte kun hæmmende forhold). En støttende vejleder, miljøskifte, ph.d.-kurser, videre arbejde med specialeemne, undervisnings- og vejlederopgaver samt kollegaer blev fremhævet som forhold, der fremmede et godt ph.d.-forløb. Vejlederen er indgangen til kontakter i miljøet og kan give faglig sparring, noget, der betragtes som vigtigt for at kvalificere den faglige del af afhandlingen og opnå faglig selvsikkerhed, men som også sættes i relation til et længere sigte, nemlig ift. at kvalificere sig til en videre forskningskarriere. Der er ikke entydige ønsker til vejlederen. For nogle er det vigtigt, at vejlederen blander sig mindst muligt og giver frihed til selvstændigt arbejde, med den faglige fordybelse, glæde og selvbestemmelse samt fleksibilitet i forhold til familie, det fører med sig. For andre er det tydeligvis ønskeligt med mere løbende tæt dialog, ikke blot i forhold til det faglige og sparring på ideer men også ift. hjælp med tidsstyring/deadlines og for at stimulere fremdrift i arbejdet med afhandlingen. De negative konsekvenser i en dårlig vejlederrelation, herunder også en utilgængelig vejleder, er tydelige; man oplever at mangle hjælp til at navigere inden for sit felt og hindres derved i den nødvendige/ønskede faglige selvsikkerhed. Nogle oplever også dårlig trivsel pga. vejleders oplevede dobbeltrolle, fx hvis vejleder samtidig er studieleder eller leder af det (eksternt finansierede) projekt, der også finansierer ph.d.-studiet. I førstnævnte tilfælde kan den ph.d.-studerende, i kombination med ikke at kende sine rettigheder, opleve at blive 'tvunget' ud i stor undervisningsbelastning, hvilket tager tid fra arbejdet med afhandlingen. I sidstnævnte tilfælde kan der komme faglig konflikt pga. indbyggede forventninger i det større forskningsprojekt om brug af bestemt forskningsmetode eller tilgang, hvilket, uforløst, hæmmer den ph.d.-studerendes mulighed for at tage ansvar og opbygge sin egen faglighed. Forholdet til vejlederen er i det hele taget udfordrende pga. den skæve magtbalance, da vejlederen ofte har stor magt over den studerendes skæbne.

Miljøskifte, kurser og undervisning/formidling er formelt indbyggede elementer i ph.d.-uddannelsen. Miljøskiftet ses, i lighed med vejleder, som en indgang til fagligt fællesskab og fordybelse og dermed opbygning af faglighed, der kan kvalificere en som forsker. Samtidig betragtes miljøskiftet som en kilde til uafhængighed og en oplevelse, der, tilrettelagt rigtigt, giver personligt udbytte og bidrager til hele familiens trivsel.

Interessant nok nævnes de kurser, der er formelt indbygget i ph.d.-uddannelsen, stort set ikke. Dette betyder ikke nødvendigvis, at kurserne ikke opfattes som vigtige

rent fagligt, men kurserne synes ikke – samlet set og her henimod afslutningen af ph.d.-studiet – at opleves at have den store betydning for selve 'flowet' i projektet (som fremmende eller hæmmende).

Den kompetence, der opnås ved selv at undervise, ses derimod som en fordel, både ift. fremtidig karriere og, hvis man er så heldig at undervise i fag, der er relevante for afhandlingen, også for ideer og udvikling af afhandlingen. Samtidig kan undervisningen opleves som produktivt (i modsætning til arbejdet med afhandlingen) og bidrage til personlig tilfredsstillelse i form af glæde og en følelse af at 'give nogen noget'. Undervisningen er dog et tveægget sværd, for opgaven opleves samtidig som en tidssluger, hvor man særlig i starten må bruge meget tid på forberedelse og dermed mister tid til arbejdet med afhandlingen. Dette giver oplevelsen af dårligere muligheder for at blive færdig til tiden og en følelse af stress.

Interviewet viste, at ph.d.-forløbet kunne være fremmende eller hæmmende for udfoldelsen af flere centrale livsværdier. De nævnte mere overordnede livsværdier spændte vidt fra tryghed til uafhængighed, fra altruisme til perfektionisme, og fra karriere til samfundsnytte[3]. Disse par skal ikke betragtes som modsætningspar, men viser, at motiverne er mange og forskelligartede for ph.d.-studerende. I de negative associationskæder var to værdier dominerende, nemlig: trivsel og viden/faglighed. De ph.d.-studerende oplevede særligt mange forhold, der gav mistrivsel og særligt mange forhold, der hæmmede deres mulighed for at opnå høj faglighed/viden.

Samtidig var den geografiske afstand til universitetet et udpræget problem for ph.d.-studerende med bopæl langt fra SDU. Flere valgte pga. afstanden til arbejdspladsen at have mange hjemmearbejdsdage, og det havde flere konsekvenser: Man følte ikke den store tilknytning til arbejdspladsen eller fik ikke opbygget et godt/ordentligt netværk. Endelig er det tydeligt, at hensynet til familien vejer tungt for ph.d.-studerende, der har børn/partner.

Resultater: Interesse for en ph.d.-café

Interviewpersonerne viste stor interesse for en ph.d.-café, og der var stor opbakning til biblioteket som vært. Alle så biblioteket som en oplagt og neutral arena, og man så det som en lettelse og en styrke for aktiviteten, at biblioteket kunne sikre en stabil afvikling.

Et cafétilbud blev set som en kærkommen mulighed for at møde ligesindede uden for ens egen forskergruppe, få flere informationer om bibliotekets services og også for at skabe kontakter på tværs af fakulteter. Det blev fremhævet som vigtigt, at caféaktiviteten blev et uforpligtende tilbud, men at det samtidig også har et fagligt ind-

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[3] En mere uddybende gennemgang af de nævnte værdier kan rekvireres ved forfatterne. Derudover henvises til de grafiske kort i bilag 1

hold, bl.a. for at legitimere den tid man som ph.d.-studerende skal bruge på at deltage i caféen.

Foreslået indhold på ph.d.-cafémøder var (i en ikke prioriteret rækkefølge):

- Biblioteksservices; fx informationssøgning, referencehåndtering, introduktion til databaser
- Arbejdsredskaber; fx NVivo og LaTeX
- Formidling; fx artikelskrivning, præsentationsteknik og populærformidling
- "Personlig udvikling"; fx motivation og planlægning, karrierevejledning
- Støttefunktioner
- Bredere oplæg om forskning og innovation

Mange ønskede oplæg og efterfølgende diskussion. Som supplerende form blev foreslået speeddating og også oplæg fra de ph.d.-studerende i konkurrenceform (ph.d.-cup). Flere ønskede desuden at kunne præsentere deres ph.d.-projekter.

Konklusion på interviewundersøgelsen

Undersøgelsens resultater peger på, at biblioteket med fordel kan udbyde en ph.d.-café. For at være attraktiv for ph.d.-studerende er det – ud over at adressere nogle af de ph.d.-studerendes oplevede barrierer for et godt ph.d.-forløb – ifølge de interviewede ph.d.-studerende væsentligt, at ph.d.-caféen:

- Udbydes på tværs af fagområder
- Giver mulighed for både fagligt og socialt netværk
- Er et uforpligtende tilbud
- Afholdes inden for normal arbejdstid

Flere temaer var gennemgående barrierer for undersøgelsens deltagere, fx oplevet stort projekt og manglende kendskab til services og støttefunktioner, undervisning og ansættelsesvilkår. Nogle af disse er oplagte for biblioteket at adressere, andre vedrører (også) andre enheders indsatser.

Rundspørgen hos de andre universitetsbiblioteker viste, at der ikke var udviklet tilsvarende aktiviteter andre steder. Til gengæld viste de andre biblioteker stor interesse for konceptet, og flere har efterfølgende spurgt ind til vores erfaringer, da de overvejer at gå i gang med lignende events. Dette viser, at det ikke ligger fjernt for universitetsbibliotekerne at påtage sig en understøttende opgave som denne, hvor der bidrages til øget trivsel blandt en bestemt målgruppe.

Ph.d.-caféen: Status og evaluering

I skrivende stund er ph.d.-caféen etableret, og de tre første mødegange afviklet.

Samtidig er der i biblioteket indrettet et fysisk område særligt dedikeret til ph.d.-studerende og café-aktiviteterne. Emnerne hidtil har været: forskeruddannelse overordnet set, litteratursøgning og karriereudvikling. Vi har afviklet caféerne i en to-timers ramme henover frokost, startende med ca. en times oplæg, hvor oplægsholder er opfordret til at gennemføre strukturerede netværksaktiviteter, fx bede deltagerne diskutere i mindre grupper. Herefter er der blevet serveret let frokost (sandwich) og de ph.d.-studerende har kunnet tale mere uformelt med hinanden. Yderligere en ph.d.-café er under planlægning. Denne vil have fokus på forskerstøttefunktioner og eksterne forskningsmidler. Særligt prioriteret i ph.d.-caféen er temaer, som vurderes at have appel på tværs af fagområder, som kan diskuteres på baggrund af (typisk) korte oplæg, og som de ph.d.-studerende i undersøgelsen oplevede som særligt barriereskabende at mangle kendskab til. Udvælgelsen af emner afhænger derudover af, hvad der kan lade sig gøre. Desuden er enkelte emner fravalgt, da de i forvejen varetages af ph.d.-skolerne og HR-service, fx undervisning/ universitetspædagogik. Senere forestiller vi os, at caféerne vil have temaer som ph.d.-studerendes retmæssige krav og rettigheder, den gode vejlederrelation, planlægning, stressforebyggelse og præsentationsteknik. Desuden vil der lejlighedsvist blive tilrettelagt events med ph.d.-studerendes egne projektpræsentationer – stadig i en tværfakultær kontekst.

Samtidig med ph.d.-caféerne er der opstået lignende aktiviteter (raw bars), planlagt og afviklet i biblioteket af de ph.d.-studerende selv, bl.a. gennem et tæt samarbejde mellem biblioteket og de ph.d.-studerendes nyligt etablerede interesseorganisation. Her har bl.a. præsentationsteknik været på programmet.

Det er vigtigt for os at evaluere temaer, oplægsholdere, tidspunkt på dagen m.m. for at optimere ph.d.-caféerne, så de forbliver relevante og tilgængelige for så mange som muligt. Vi vurderer løbende internt i arrangørgruppen tilbuddets succes ud fra antal tilmeldinger (målet til hver café er min. 20 tilmeldinger), gengangerfrekvens og aktivitet på de enkelte caféarrangementer (subjektive vurderinger i arrangørgruppen). Vi vurderer også løbende de forskellige fagområders repræsentation, da vi ønsker at tiltrække deltagere bredt blandt de ph.d.-studerende og holde fast i at give dem mulighed for at mødes på tværs af fagområder (fx gennem valg af oplægsholdere, emner mv).

Ph.d.-cafétilbuddet vil blive evalueret systematisk med deltagerne, når ph.d.-caféen har kørt det første års tid. De ad-hoc tilkendegivelser, vi har fået fra de ph.d.-studerende hidtil (spontane mails), viser, at deltagerne ser tiltaget som en "super god mulighed", som de ph.d.-studerende gerne vil bakke op om, at caféen "klæder

de ph.d.-studerende godt på til ph.d.-processen", samt at caféerne giver en "tiltrængt mulighed for at møde ligesindede", som man ikke gør i hverdagen på sit institut.

Fremmødet til ph.d.-caféerne har hidtil typisk været på 15-20 personer. Mundtlige tilbagemeldinger tyder på, at formatet opfattes som en ligelig fordeling mellem faglige og sociale input, således som der blev udtrykt ønske om i undersøgelsen. Også tidsrammen har virket passende; de fleste bliver her i de 2 timer som arrangementet varer.

Vi havde forventet, at særligt ph.d.-studerende fra de "tørre" fag ville benytte tilbuddet, da det er her, der typisk er størst problemer med oplevet ensomhed, jf. bl.a. Herrmann et al. (2014). Men det har vist sig, at der især kommer studerende fra de "våde" områder naturvidenskab og teknik. Det er endnu for tidligt at udpege årsager til dette, men en forklaring kan være, at ph.d.-studerende fra disse områder generelt har større fysisk tilstedeværelse på universitetet, og at det derfor praktisk set er nemmere for dem lige at smutte over på caféen. Desuden er det tydeligt, at ph.d.-caféerne tiltrækker mange udenlandske ph.d.-studerende. Dette kan skyldes, at netop den gruppe har et begrænset netværk på universitetet, og måske derfor i det hele taget føler sig mere overladt til sig selv med deres ph.d.-projekt. Denne gruppe har vi dog slet ikke haft som del af undersøgelsen, af rene afgrænsningshensyn. Men de er naturligvis mere end velkomne på caféen, der af samme grund også afvikles på engelsk.

Afrunding

Det helt store problem for mange ph.d.-studerende er en oplevet ensomhed. Man kan måske sige, at ensomheden ligger i et ph.d.-studies DNA, idet arbejdet med at udarbejde og forfatte en ph.d.-afhandling i sagens natur må ske på individuel basis. Men, som Herrmann et al. (2014) også peger på, så er årene, hvor man er indskrevet som ph.d.-studerende, også en dannelsesproces, hvor der sker en akademisk socialisering, som netop sker mest effektivt, når ph.d.-studerende føler sig som en del af et kollegialt miljø, hvor de betragtes som ligeværdige (fagpersoner). Det er derfor vigtigt at understøtte de ph.d.-studerendes sociale netværk – også på tværs af fagområder, da der her også sker en socialisering ind i en større akademisk kontekst, hvor de oplever at være del af hele den akademiske verden.

Man kan måske fortsat diskutere, om det overhovedet er et biblioteks opgave at etablere denne slags understøttende aktiviteter. Vi har i forbindelse med projektet inddraget universitetets ph.d.-skoler, særligt for at få kendskab til og dermed kunne undgå at komme til at konkurrere med evt. andre lignende aktiviteter. Vi har kun mødt opbakning til projektet; ph.d.-skolerne har generelt udvist stor interesse og bidrager løbende til markedsføringen. Fx distribueres invitation til de enkelte ph.d.-caféer gennem ph.d.-skolerne, ligesom ph.d.-cafeen formidles på ph.d.-skolers op-

startsmøder for nye ph.d.-studerende. Kontakten til ph.d.-skolerne er fortsat meget vigtig, og vi sørger for, at den løbende er til stede. Her hjælpes projektet også af, at biblioteket på SDU koordinerer universitets ph.d.-kurser i ansvarlig forskningspraksis, samt at vi i biblioteket også har et tæt samarbejde med det nyligt etablerede talerør for ph.d-studerende i national sammenhæng (PhD Association at the University of Southern Denmark - PAUSD). Udover opbakningen fra ph.d.-skolerne pegede de ph.d.-studerende (som tidligere nævnt) også på biblioteket som en naturlig arrangør, dels fordi biblioteket er neutral grund og kan sikre en kontinuerlig afholdelse; dels fordi biblioteket også er et tværfagligt sted, som opfattes at kunne facilitere mødet mellem forskellige fagområder.

Det er håbet, at universitetsbiblioteket ved SDU med introduktionen af de omtalte nye services for ph.d.-studerende kan være med til at hjælpe den nødvendige akademiske socialisering afgørende på vej, således at flere ikke bare gennemfører ph.d.-forløbet, men også bagefter kan se tilbage på ph.d.-årene som konstruktivt formende år.

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Bilag 1. Kort over interviews.

Læsevejledning: Jo højere oppe i kortet, jo mere abstrakte konstrukter; nederst vises de konkrete nævnte egenskaber ved ph.d.-studiet, i midten opfattede konsekvenser, øverst værdier. Linierne angiver de kognitive forbindelser, dvs. at begreberne under interviewet er nævnt i en subjektiv (kausal) relation.'%' angiver, at en associeret egenskab eller konsekvens af interviewpersonen blev oplevet som at have forhindret en væsentlig værdi i at blive udfoldet.

Diagram (HUM2):

Perfektionisme

Faglig stolthed — Tage ansvar

Trivsel

Personligt udbytte

Få adjunktur

%

%

Ubalance i arbejds-/privatliv — Blive færdig

Fremtidige forsknings-projekter

Bedre afhandling

Spændinger

Kvalificere sig som forsker

Kendskab til nyeste publikationer

Støtter

Forventninger om bestemt forskningsmetode — Tidspres

Vejleder kender ikke dansk ph.d.-proces

Finde rundt i systemet

Vejlederskift

Opleve en anden kultur

Vejleder har flere roller

Faglig sparring

Faglige kontakter

Ekstern finansiering

Vejleder i udlandet

Vejleder

Miljøskifte

Kollegaer

HUM2

Diagram (HUM3):

Glæde

Gøre det godt/løfte sig over det banale

Være en god mor

Ikke sumpe/lave noget

%

%

%

Forsumpet studerende

Tvivl om man kender feltet godt nok

Ingen social udveksling

Fordybe sig

Spilder tiden

%

Ikke del af fagfællesskab

Vant til struktureret arbejdsdag

Meget at sætte sig ind i

Har ikke undervist med relation til eget projekt

Hente og bringe

Svært at få overblik over services

Mangler hjælp til at navigere

Bøger over det hele

Arbejder meget hjemmefra

Diffust projekt

Har ikke holdt oplæg om projektet

Miljøskifte

Erfaring fra almindeligt arbejde

Ikke struktur på afhandlingen fra start

Fået barn

Skrive ansøgning om indskrivning

Stor organisation

Bor langt fra universitetet

Lang deadline

Utilgængelig vejleder

Formelle krav

HUM3

Fællesskab/
ikke ensom

Blive mere sikker

Blive færdig
til tiden

Stress

Irritation

%

Sikkerhed for at
man er på rette vej

Gardere sig mod
faglig kritik

Leve op til
kravene

Tager tid fra
afhandlingen

Overskuelighed

Møder andre i
samme
situation

Faglig sparring

Ikke bruge tid på
forventnings-
afstemning

Bruge meget
tid på
forberedelse

Tage det i
små bidder

Administration

Kender
vejleder fra
BA og MA

Forventning om
artikelleverance

Kontorgang med andre
ph.d.-studerende

Fakultetets
forskeruddannelsesprogram

Miljøskift

Vejleder

Institutleder

Lang
deadline

Pres for at
undervise tidligt

Miljøskift

HUM4

Trivsel

%

Bruge sin tid
hensigtsmæssigt

Overblik/kontrol

Fællesskab

Føle sig
bagud

%

%

%

%

Kan ikke fokusere

Trække sig
socialt

Mindre faglig
sparring

Mindre
fordybelse

Dårlig start på ph.d.-
studiet

Stor undervisnings-
belastning det første år

Ingen fast
arbejdstid

Føler ikke
tilknytning
til kontoret

Dårligt
arbejdsmiljø

Kender ikke
mulighederne

Manglende
kendskab til
rettigheder

Vejleder har
dobbeltrolle

Ingen introduktion
til værktøjer

Ingen
introduktion til
støttefunktioner

Arbejder
meget
hjemme

Skiftende
kontorkollegaer

Kollegiale
konflikter

Stort institut

Bor langt
fra uni

Delekontor

Mange ikke-
fastansatte

SAMF1

SAMF2

Forstå verden

Selvtillid

Selvbestemmelse

Blive færdig til tiden

Effektivitet

%

Problemer med helbredet

Undgå eksistentiel krise/ Robusthed

Gøre hvad man selv vil

Blive klogere

Kan magte svære ting

%

%

Ikke bruge tid på andre

Mental belastning

Andre kan forstå projektet

Ved hvad man skal fokusere på

Får ikke dyrket motion

Hjælp til deadlines

Sætte sig ind i store mængder tekst

Give faglig frihed

Struktur på projektet

Arbejde hjemme/ arbejde sent

Svært at afgrænse sit arbejde

Tager energi fra projektet

At lave et ph.d.- projekt

Er måske ikke et karriereforløb

Sygdom i familien

Vejleder

Dårligere løn

Speciale (kandidat)

Fleksibilitet i ansættelsen

Skal undervise

SAMF3

Karriere

Hensyn til familien

Komme samfundet til gode

Gøre sig relevant til videre ansættelse

Tid til fordybelse i det afgørende sidste år

Fagligt udbytte

Mere robuste kandidater

Komme videre

Fordybe sig

Blive vellidt

Brugbart resultat for praktikere

Bruge tiden effektivt

Arbejdsro

Pendle til og fra hver dag

Tæt på bivejleder

Bedre vejledning af kandidat- studerence

Følger op

Undervisning nem at få af vejen

Erfaring med at håndtere større projekter

Kende problemstillingen

Vejleder

Påtage sig andre opgaver på instituttet

Miljøskifte i DK

Miljøskifte

At tage en ph.d.

Erfaringer fra tidligere job

Afvikle ph.d.- kurser tidligt

Uafhængighed

Selvtillid

Faglig udvikling

Trivsel/livsglæde

Give nogen noget

Følelse af at kunne

Ny energi

Mening med livet

Ude på egen hånd

Feedback på ideer

Samvær med kollegaer

%

Hjælp med tidsstyring

Bliver stresset

Hjælp til at etablere sig i fagmiljøet

En del af forskningsgruppen

Opbakning

Produktivt

Vejleder

Kaffestue

Fået barn

Lange deadlines

Miljøskifte

Kontor hos forsknings-gruppen

Være ph.d.-stud. i Danmark

Sociale arrangementer

Familie

Uklare opgaver

Undervise

SAMF4

Respekt for andres tid

Selvrespekt

Perfektionisme

Udrette noget

Glæde

God forsker

hensyn til familien

(%)

(%)

(%)

%

%

%

Gøre det rigtigt

%

%

Opfinder måske ikke noget nyt

Ideer til forbedring

Dårlig arbejdskultur

Hvem bestemmer?

Bliver glemt

%

Forventninger til min faglighed

Henter viden fra samarbejdspartnere

Mangler overblik

Kender ikke krav og rettigheder

Uklar rolle på instituttet

Tilfældig litteratur

Kun fokus på det faglige

Ses som fagperson af eksterne

Lave noget spændende

Faglig sparring

Forskningsenhed ikke integreret i instituttet

Kender ikke hjælpefunktioner

Dårlig til litteratursøgning

Fleksibel arbejdstid

Administration

At være ph.d.-studerende

Emnefrihed

Vejleder

Kollegaer der sender mails om natten

TEK1

Frihed
Selvstændighed
Faglig stolthed
Glæde
Karriere
%
%
stressende
Personlig indflydelse
%
Må planlægge
Dårligere faglig kvalitet
Usikker på kravene
Privat løsning
Hjælpe med at skaffe midler
Sætter selv dagsordenen
Ingen feedback
Umuligt at vejlede studerende
Svært at få tid i sammenhæng
Ingen nemme publikationer
Eget projekt
Pres for ekstern finansiering
Erhvervserfaring
Deltids-ansættelse
At undervise
Uklare formalia
Ikke i forskningsgruppe
Dårlige kontor-faciliteter

TEK2

Ideer
Viden
Fællesskab
Tryghed
Arbejdsdisciplin
Bedre udbytte for de studerende
%
%
Mindre samarbejde
Fedt når noget virker
Svært at afdække formaliteter
Bruge tiden effektivt
Mindre tidsforbrug
Studerende får praksiserfaring
Samarbejde
Mange arbejder hjemme
Forskerkollegaer er tilgængelige
Opmærksomhed på undervis-ningsbelastning
Spændende emne
Dårlige kontor-faciliteter
Kan afvikle forsøg
Åben arbejdskultur
Ph.d.-studerende bliver regnet som fagpersoner
Andre ph.d.-studerende
Ny adresse
Nært forhold til vejleder
Undervise

TEK3

Få job

Blive færdig

%

Læse artikler

Noget der kan bruges til noget

Spild af tid

%

Ingen synlige resultater

Andre spørger

%

Få viden

Kan ikke vise noget, der er lavet

Mindre fagligt overblik

Svært at fokusere litteraturstudie

Besværligt

Nogen at spørge til råds

Svært at læse artikler

Ingen videndeling

Ingen feedback

Uklare krav

Har været ude af det akademiske miljø

Nyt center

Ingen retning

Lang deadline

Ingen kontakt til kunden

Begynde sammen med andre ph.d.-studerende

Administration

TEK4

Peer feedback among international PhD students

Sofie Kobayashi, Assistant Professor, Department of Science Education, University of Copenhagen.

Research article, peer-reviewed

In a PhD course for new PhD students peer feedback was introduced to reduce teacher time on feedback and to enhance the learning environment. The results of the changes to the course are not conclusive with regards to teacher time, since there were also other changes made to the programme, but overall teacher time on giving feedback has been reduced. Peer feedback in higher education is seen as one way to enhance the learning environment for students as it builds on principles of formative feedback during the course of study and when students give feedback it has been shown to enhance learning. The results from this study support this view, but improved learning was only observed after peer feedback was integrated in teaching and learning activities embedded in the course rather than as an add-on.

This article describes and evaluates the introduction of an element of peer feedback in a PhD course. Peer feedback was introduced with the double goal of saving teacher time and enhancing learning outcomes. The changes made to the course were initiated as a development and learning project undertaken as part of my participation in the Teaching and Learning in Higher Education Programme (Universitetspædagogikum) in 2016. The aim of the article is to share experiences that indicate that this double goal is achievable when a) assessment (or feedback) criteria are explicit and shared and b) peer feedback is an integral part of the course.

Problem statement and intervention design

The PhD course in question is the Introduction course for new PhD students at the University of Copenhagen, Faculty of Science, a five days' intensive residential course, off campus that was initiated in 2007. The participants submit two assignments, one is an essay on Responsible Conduct of Research and the other is a Personal Development Plan (PDP).

Initiating problem

As course responsible I have been asked to cut the time that course teachers spend on this course, for the department to generate an overhead to fund research. As the feedback on assignments is time consuming, this is an obvious place to cut teacher time.

Financial sustainability was the trigger to consider peer feedback on PDP assignments. Although, the PDP submission is quite a specific circumstance, it was recognized that the study's findings would be of interest more broadly in academia since there is widespread concern about the amount of time that higher education tutors spend giving feedback to students. However, there is also widespread understanding that any alternative should not compromise the quality of teaching and learning. For instance Boud and Molloy (2013, p. 703) state that: 'The practical dilemma of higher education is that the amount and type of feedback that can realistically be given is severely limited by resource constraints…'

The problem of cutting teacher time becomes complex when considering how to maintain the quality of teaching and learning. However, peer feedback is an option, since this has been shown to have advantages in terms of enhancing learning, and there are a number of studies that indicate that both the one providing feedback and the receiver learn from the peer feedback process, e.g. Althauser and Darnall (2001); Cho and Cho (2011); Li, Liu and Steckelberg (2010). In general, teachers find that giving feedback is particularly time consuming when a submitted assignment leaves a lot of room for improvement. For the course that forms the basis of this study, there are usually one or two participants who seem lost, do not ask for help and submit very meager assignments. Through peer feedback help will be 'forced' on them, and they get to see other PDPs and can learn from their peers. Further, the process of giving feedback will help them understand the concept of the PDP and the criteria for a good assignment, and this will help them build capacities in self-assessment and self-regulation for their own future competence development. Hence, by giving feedback to their peers, it is our hope that all course participants will grasp the ideas of the PDP and submit good assignments. This will ease the effort needed for teacher feedback as it is the lower quality assignments that are most demanding to assess and comment on.

Challenge

The challenge that this project sets out to address is to both increase financial sustainability and enhance the learning environment through the use of peer feedback on assignments, and if possible to identify some conditions for this achievement.

Context

From the inception of the course, teachers have provided feedback to course participants on their PDP assignments. The aim was to provide formative feedback in the spirit of helping them to think further and encourage them to use the PDP for the annual Performance and Development Review (MUS) and Progress Assessment Reports. The PDP assignment is designed to support the Intended Learning Outcomes

(ILOs) of the course. The most relevant ILOs in relation to the assessment of the effects of peer feedback on PDP assignments are outlined below:

- To position you to take charge of your PhD studies
- To take steps to co-manage the working relationship with your supervisor(s)
- To be able to navigate the personal / individual aspects of your PhD studies (e.g. work/life balance, motivation, stress)

The course activities and the PDP assignment urge participants to think about their present competencies, their career plans and goals, and make plans for competence development throughout their PhD. The PDP also includes sections on work-life balance, networking and collaboration with supervisors.

The first ILO, taking charge, is linked to Self-Determination Theory (SDT) and is an underlying premise of the course. According to Ryan and Deci (2000) autonomy plays an important role in building motivation, on a par with feeling competent and related. PhD students who feel that the supervisor is the sole or main decision-maker may be at higher risk of losing their motivation. Such expectations are more common among PhD students from educational environments where it is the norm to listen to the teacher and do as told, and as such it is more common among some sections of international PhD students (Elliot & Kobayashi, 2017). Danish supervisors expect PhD students to be quite autonomous from the outset, and hence 'taking charge' can also help align expectations in the supervisory relationship. One supervisor wrote of her two PhD students from an African country: 'They had been coached to take ownership of their own PhD project, which came out very prominently in successive supervision meetings'.

One objective we strive for under the first ILO, taking charge, is to raise awareness about the kinds of feedback participants might get from peers and supervisors as a way to develop their competencies throughout their PhD. We do this through a session about feedback, and we discuss specific vs. general feedback, the idea of constructive feedback and during the last year also formative and summative feedback (Black & Wiliam, 2009). The main goal is to equip participants to discuss their expectations for feedback with their supervisors, and we aim to achieve this by having them work with feedback themselves. Here we take the constructivist view of learning for granted; that learning is enhanced through active engagement. I find the social constructivism meaningful in this context (Dolin, 2015; Dysthe, 1995), as interaction and communication about feedback enables the participants to ascribe meaning to different types of feedback and how feedback can enhance the learning process.

Furthermore, it is very important for a good PhD process to be able to ask for help, including feedback, and hence also to be able to give feedback to others for reciproc-

ity. It falls under the concept of relational agency, which has been defined by Edwards and D'arcy (2004, p. 149) as the 'ability to seek out and use others as resources for action and equally to be able to respond to the need for support from others'. The relevance for doctoral education has been established by e.g. Hopwood (2010). Giving and receiving feedback thus supports the main ILO of the course, taking charge of PhD studies.

Feedback and assessment

In its simplest form feedback is a piece of information, written or oral, given to students, almost synonymous with telling students how well they did (summative feedback) or what to do next (formative feedback). This builds on the assumption that if only students do as they are told, they will improve their performance. Boud and Molloy (2013) question whether this is actually feedback, or only information, and they continue discussing the feedback loop; 'The cycle needs to be completed. If there is no discernable effect, then feedback has not occurred' (p. 702). A discernable effect requires an assessment of student performance in two subsequent tasks, first an assessment of competencies in one task, and a subsequent task in which the student can demonstrate their learning. Hence, they add a step to the framework of Hattie and Timperley (2007) where feedback is the assessment of a first task, feed up is setting (reachable) goals for development and identifying the gap and feed forward is the steps needed to close the gap. Boud and Molloy (2013) emphasise that feedback 'needs to be conceptualized as an explicit part of the design of the course or programme' (p. 702), and hence not just an add-on. Peer feedback requires training, and this is a point that I will revisit in the discussion.

Setting *reachable* goals during feed-up (Hattie & Timperley, 2007) refers to Vygotsky's concept of the Proximal Zone of Development (PZD) (Dysthe, 1995; Vygotsky, 1978) and what Ryan and Deci (2000) frame as an 'optimal challenge' for a person to feel competent and thus build motivation and self-efficacy beliefs. If the goals are too high, the gap becomes too wide for the learner to fill. The consequence is that feedback needs to be balanced for the learner to find it meaningful to engage with the challenge. In the PZD learners can succeed when getting help from adults/ teachers/ more experienced others. The wider the gap, the more help is required for the learner to succeed. This is referred to as scaffolding, and engaging in dialogue with others is a fundamental aspect of scaffolding (Dysthe, 1995). Topping (2010) mentions other means of scaffolding, such as guiding prompts, sentence openers and cue cards.

It should be clear from the above that feedback is not possible without assessment. Assessing the quality of a product or the competencies of a student is necessary in order to facilitate further learning. In the introduction I stated that we provide 'formative feedback' with the aim that the participants can use the PDP in further compe-

tence development throughout their PhD studies. The consequence of working with the proximal zone of development is that students will not get the same level of feedback, but each student will get feedback that can help them develop from the specific level they are at, to a desired and achievable higher level. This will not be the same for all students. Teachers will assess the students' levels and learning needs, and give each student individual feedback on that basis, and hence the validity of the feedback will be high for each individual student.

The use of the term 'formative feedback' implies that the purpose of the feedback is to support further learning and development. The formative – summative divide seems quite clear at first glance; formative feedback is feedback *for* learning while summative feedback is feedback *of* learning. However, even summative assessment, the assessment of learning outcomes, can be used formatively when students are involved in the process. The concept of *formative assessment* as defined by Black and Wiliam (2010) closes the feedback loop: 'We use the general term assessment to refer to all those activities undertaken by teachers - and by their students in assessing themselves - that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes formative assessment when the evidence is actually used to adapt the teaching to meet student needs'. (p. 82). Formative assessment is broader than assessing a product or competence and giving feedback, as it involves feedback as one element together with activating students as resources for one another and as owners of their own learning (Black & Wiliam, 2009; Dolin et al., 2017). In formative assessment students are involved in the whole assessment and feedback loop. They are involved in setting achievement goals, they produce work to be assessed and they are involved in assessing their own work. Dolin et al. (2017) emphasise the importance of the assessment being both criterion-referenced and student-referenced. Criterion-referenced assessment is based on external predetermined criteria and standards and is needed for students' (and teachers') feedback that points towards the goals of the course. Student-referenced assessment is based on comparisons with the student's previous performance and expectations for this performance, and this is valuable for setting achievable goals with reference to Vygotsky's PZD. Assessments can be made by the teacher, other students (peer assessment) or the student themselves (ipsative assessment (Hughes, 2011). The student is also involved in deciding on the next steps in the learning process, and the next steps and next activities complete the feedback loop.

The competencies that can be developed through peer assessment are also worth considering. Topping (2010) points to the 'longer-term benefits with respect to transferable skills in communication and collaboration' (p. 395) as well as 'ancillary benefits in terms of the self-regulation of one's own learning' (p. 396). Boud and Soler (2015) use the term *sustainable assessment* to indicate assessment with a forward

looking dimension that prepares students to meet their future learning needs, thus equipping students for judgement and decision-making beyond the timescale of a course. For PhD students this would help build their ability to judge their own work and that of others, goals that are often emphasized as objectives of PhD education; to become an independent or autonomous researcher (Tinkler & Jackson, 2004). Both peer and self-assessment could be added as ILOs for the course to emphasise the importance for these competencies in PhD education and beyond.

Intervention design

To achieve the double goal of reducing teacher time and enhancing student learning an intervention was designed to introduce peer feedback on the PDP assignments through a number of steps. The identification and explication of assessment criteria is critical for students to engage in the assessment process, as outlined above. The steps in the intervention were:

1. Organising a meeting in the teaching team to explicate the criteria we use in giving feedback on PDPs.

2. Writing up the 'peer feedback criteria' and sharing with the teaching team. The peer feedback criteria should be written in a way that encourages course participants to ask questions that can help the author of the PDP to think further.

3. Testing the peer feedback criteria while giving feedback on PDPs (June 2016).

4. Instructing course participants at the following course to give feedback to two peers, so that each participant receives feedback from two others (September 2016).

5. Comparing the PDP assignments submitted with earlier assignments, to see if it is possible to judge whether the quality increases.

6. Constructing and distributing a questionnaire to get feedback from participants after the assignments have been approved, to learn how they perceived the peer feedback.

Based on these experiences the next iterations of the course were developed, with reference to the experiential learning cycle developed by Kolb (1984).

Implementation

Steps 1-3: Before this project started, the explication of criteria was mainly the responsibility of the teachers who shared old assessments and feedback with new teachers and through co-assessment of PDPs that required a second opinion. The core team of teachers discussed assessment criteria that we have (more or less tacitly) used when giving feedback. The criteria were written up and tested through

teacher assessment and feedback in a course in June 2016, and they worked well for us as a reference. The criteria have been provided to course participants from September 2016.

Designing peer feedback groups

Step 4: Feedback groups in the September 2016 course were deliberately designed for internal variation based on our experience with assessing PDPs throughout the years. Although we did not make any systematic investigation of the reasons why students submitted thorough or inadequate PDPs, the teaching team had some insights based on face-to-face feedback sessions with participants in earlier versions of the course. Some participants have difficulties in grasping the idea of making a development plan as they are not used to working with the 'soft side' of their own development (being Scientists), or because cultural differences constitute a barrier to their understanding, especially understanding that they can set their own goals and steer the process rather than depending on the supervisor. Some also have language difficulties. Others do not find the exercise meaningful, or sense that their supervisors would not appreciate them spending time and effort on developing a PDP. Others again do not have the time, or do not prioritize the PDP over other tasks. Hence the parameters used for designing internally varied groups were mainly societal (national/educational) background, gender and level of participation during the first days of the course (engagement). It was assumed that these criteria would reflect the students' potential personal investment in the PDP. In the September course we ensured a high internal variation in the feedback groups based on national/educational background and gender.

Technicalities of peer feedback in the Learning Management System

Step 4: The Learning Management System (LMS, called CANVAS, https://www.canvaslms.com) has different options for peer feedback: the default option is a peer grading system and rubrics with a prescribed format for giving peer feedback that requires (enforces) peers to give feedback, so that each participant would give and get feedback from two others. This option is apparently based on ideas of controlling the behaviour of the participants do 'what they are supposed to', which actually goes against our aim of putting participants in charge of their PhD studies. The other option is to organize participants in groups and assign a sub-site for each group where they can upload and download documents as they wish. This was more in line with the kind of feature that we prefer, because it leaves the activities up to course participants to organize. It may take more work to get them to use the group space, and it may provide less scaffolding for the insecure participant because the system does not lead them through the process step-by-step, however, giving course participants their own space offers them the opportunity and experi-

ence of organizing their peer feedback. The framework for self-determination developed by Ryan and Deci (2000) suggests that motivation can be supported through feeling competent, autonomous and relatedness. The default option of a peer grading system and rubrics leaves very little room for choosing methods, and no room for collaboration among group members. Hence, this approach would mean the course organizers would miss an opportunity to support autonomy and an opportunity for them to build collaboration among peers.

On the last day of the course and through an announcement in the LMS, course participants were instructed to upload assignments to their group sub-site folders and give each other feedback. They were given deadlines for the draft PDP for peer feedback, feedback criteria were available to them and a deadline for the final PDP to be submitted to the course teachers. The hope (and hypothesis) was that peer feedback would reduce the number of students who struggled with the assignment, and that ultimately this would reduce the amount of time that teachers needed to spend on feedback.

However, the submission process in the LMS was not 'foolproof' since the folder for the final PDP submission was also available, and many participants uploaded their draft PDP into this folder. Obviously, many participants had not found the group sub-sites.

PDP assignments

Step 5: The PDP assignments in the September course did not stand out as better than average. Four (out of 23) were asked to resubmit, at least three were inadequate, but were still acceptable, and around five were really good with substantive thinking reflected in the writing. The picture wasn't any better than the norm for the course when only one or two students are usually asked to resubmit. Thirteen participants had uploaded draft assignments into the folder for final assignments, including the four who were asked to resubmit. The activity in the group sub-sites reveals that five groups had engaged in peer feedback to a varying extent, but there is no clear trend towards a correlation between peer feedback and quality of assignment.

We gained further insights into possible effects of peer feedback by comparing the draft PDPs, the feedback provided and received and the final PDPs submitted. This comparison was carried out for eight participants. The conclusion from this comparison was that it was the students who actively engaged in giving feedback who used the feedback the most. Reading other group members' assignments also seemed to further inspire these students, as elements from one PDP assignment sometimes recurred in other PDP assignments within the same group. It was also noted that the feedback the students provide reveals a lot about their understanding of the task,

and using the criteria for feedback does seem to scaffold the development of understanding for some students.

PhD student experiences of peer assessment

Step 6: I distributed a questionnaire to get the students' experience of how the peer assessment worked. I received eighteen responses to the questionnaire from the 23 participants. The responses indicate that peer feedback has potential, since half of the respondents found the peer feedback useful, both in terms of giving feedback, assessing other PDPs and receiving feedback.

Of the 18 respondents, 60% found it meaningful to give peer feedback while 17% found it difficult, and another 17 % did not give peer feedback (two found the technicalities of the LMS to be a barrier and two were not confident that they could provide good feedback). Similarly, 60% found the feedback criteria helpful, while 27% found it difficult to use the criteria. Reviewing other PDPs seemed to help the vast majority.

Satisfaction with the feedback they received was slightly lower, in that 47% found the feedback useful. 18% felt they received praise that could support subsequent learning, another 12% did not find the feedback useful, and 18% did not get feedback. These experiences indicate that PhD students can benefit from being trained to give feedback and how to use assessment criteria during the course.

Summary of findings

Overall, this first iteration of using peer feedback in the Introduction course did not seem very successful in terms of higher quality assignments and less need for teacher feedback. Still, the analysis of the sample of assignments and peer feedback, and a questionnaire distributed to participants, indicate that peer feedback has the potential to support learning in the course. The following discussion focuses on the experiences from this first iteration in light of literature about formative assessment, and it strives to identify ways to make peer feedback more effective in the course.

Discussion and next iterations of the course

Group formation

The parameters we used for group formation are by and large supported by Topping (2010) who lists academic and social factors to consider when matching students, like year of study and academic ability, background experience in peer assessment (good or bad experiences) and culture and gender. We can be more explicit in matching participants with different background experience. This is most likely connected with educational and societal culture, which we very coarsely identify as nationality. It is, however, important not to make too rigid assumptions based on na-

tionalities, but this was a pragmatic choice. In the future it would be interesting to combine this approach with a quick survey of the students on their experiences with peer feedback (good, bad, none). This could benefit the composition of the groups and student engagement in the activity. Another change to consider for future iterations of the course would be to create groups that are internally homogenous - that is the students in the groups have similar experiences and goals. It can be argued that this approach would enhance learning since the participants would (ideally) engage in discussions with others at similar levels, and not rely on the experienced peers to take control or just show the inexperienced members what to do next. However, in heterogenic groups they get the experience that they can help each other, and that will support their relational agency (Hopwood, 2010) and independence from teachers. Also, the use of homogenous groups would require teachers to support the inexperienced students, rather than stepping back and allowing the more experienced peers to do the support, so this approach is unlikely to reduce the number of hours that the teachers spend on the course.

Integrating peer feedback in the course

Boud and Molloy (2013) emphasise the importance of integrating peer feedback explicitly in the course, rather than using it as an add-on once the course is finished. In earlier iterations of the course we provided feedback to participants after the course, The idea was that the formatively intended feedback that for a long time was supported by face-to-face meetings after the course would support the PhD students in their further competence development. What we missed out with this approach was building the competence of self- and peer assessment or develop their judgement beyond the time frame of the course. The framework Boud and Molloy (2013) suggest for sustainable feedback is characterized by involving learners in dialogue and facilitating feedback processes to develop assessment capacities. This implies that feedback needs to be an integrated part of the course where course participants are trained in giving and using peer feedback. Such training is especially important for participants with limited or negative experiences with peer feedback, and as Topping (2010) mentions 'Students from different cultural background may be very different in acceptance of peer assessment' (p. 397).

The consequence of prioritizing the proximal zone of development, as noted earlier, is that not all students will get the same level of feedback. This contrasts with the summative exam situation where assessment is purely criterion-referenced (whether criteria are tacit and norm-based or explicit) and results have meanings for third parties. When the PDPs in the Introduction course are assessed, this information is then used for giving student-referenced feedback, so with the above in mind it is apparent that the reliability of the feedback across assignments is low. Higher reliability could be achieved if all course participants are assessed according to external

criteria (criterion-referenced), which is important in exams where the grade matters for future careers (it allows future employers to judge competence levels). In the present format, the course aims to provide feedback that will help individual PhD students develop the competencies required to succeed in their studies The mixture of student-referenced and criterion-referenced feedback we use as teachers is continuously leveled out through comparison and discussion in the teacher team. Peers do not, however, have the opportunity to discuss and agree feedback, and therefore the feedback they provide may vary to a higher degree. Hence, reliability among peers' feedback may become an issue, and this makes it difficult to convince students that peer feedback is trustworthy (Topping, 2010). It is doubtful that peers can (or trust that they can) give the same type of feedback as the teachers, especially if they did not understand the task in the first place. When reading through the feedback that participants provide each other, some of this is at the level of our own feedback, while other feedback seems somewhat off track. The set-up with groups of three is a way to ensure that all course participants will get sufficient level and quality of feedback, and this makes it important to ensure that all participants engage in the peer feedback exercise. In practice some participants provided minimal feedback, although on the whole the majority of students did seem to understand and use the feedback criteria. But, there were two respondents to the questionnaire who stated that they did not give feedback because they were not confident that they could provide good feedback. The variation in the peer-feedback provided and the reluctance by some to engage in peer-feedback stresses the importance of training students how to give feedback and then allowing them to work with the criteria during the course to scaffold them in their practice, i.e. integrating feedback in the course, as Boud and Molloy (2013) suggest.

In the September 2016 course that trialed the peer-feedback approach, the feedback criteria were shared with course participants from the first day for guidance and transparency, in line with recommendations from literature (c.f. Gulikers, Bastiaens & Kirschner, 2008). The aim was to guide the learning process and support the development of self-assessment capacities. However, the criteria were not actively incorporated into the teaching and learning activities, but in the 2017 course activities were included that enabled the participants to give criterion-referenced peer feedback on specific sections of the PDP that they worked with during the course. It also became apparent that it was important for the students to work in the group subsites in the LMS during contact time with teachers so that they became familiar with the technicalities. The questionnaire from the 2016 course revealed that two respondents said they did not give feedback because the technicalities of the LMS were a barrier. Limited wifi at the course centre was also a barrier to using the LMS more actively in previous iterations of the course.

In the section about the implementation I discussed my reasoning for choosing the open group sub-sites for peer feedback, and avoiding the enforcement of the LMS system, making peer feedback required. However, enforcement and control will not support the PhD students in taking charge. However, enforcement as an extrinsic motivation may ensure that all the participants become experienced in giving feedback that their peers can use, and hence lead to personal engagement with the process and help them internalize the value of mutually giving and taking feedback. Another aspect of this refers to reliability; if some participants get limited or irrelevant feedback as a result of the peers not feeling adequately equipped to provide this kind of commentary, then rubrics may be a good support to ensure that everybody provides more substantial feedback. Another way forward is to work with the criteria and peer feedback during the course, and that is the path the course will follow in the future as it gives the students a chance to build useful competences for completing and enjoying the PhD study.

The first changes we implemented during 2017 included the integration of a session on feedback with the first session concerning the PDP (competence mapping) on the first day of the course, and the provision of time for the students to practice giving feedback to each other in all the PDP sessions. This has resulted in higher quality assignments. From all the assignments submitted from the four courses run in 2017 (91 in total) in only three cases were the students asked to resubmit. None of the assignments were considered shallow or inadequate, but all showed engagement with the topics. The reasons for resubmission were mainly of a technical nature rather than conceptual nature, and only one student had difficulties understanding a question. This is considerably better than before we introduced working with peer feedback during the course. This indicates that peer feedback does not work as an add-on, but only when integrated in the course, and this is what Boud and Molloy (2013) suggest, and what Nicol and Macfarlane-Dick (2006) describe as part of their principles for good feedback practice. If we assume that substantive and engaged assignments reflect better learning and an enhanced learning environment, then we did succeed in achieving this goal.

The other goal we had with introducing peer feedback was to cut the time teachers had to spend on giving feedback and so increase the financial sustainability of the course. This goal is linked to a variety of factors. In earlier versions of the course teachers inserted comments in assignments and the annotated documents were returned to the students by email. With the introduction of the LMS, teachers had access to a system called Speed-grader, which does not encourage long paragraphs of feedback. So, instead of writing comments in students' PDPs, when using the LMS teachers would write only the most important points in the Comments field in Speed-grader. Just using this function alone, offered the opportunity for teachers to reduce the time spent on feedback Secondly, the peer feedback influenced teachers'

perceptions of how much time and effort should be spent on giving further feedback. Since the students already had feedback from their peers the teachers did not feel the same obligation to comment on every section of the PDPs. The third perspective is that it takes a longer time to give feedback on an assignment that is not very good. An example is an assignment by a student who has not understood one of the questions. One teacher faced with this situation wrote, 'I've asked [name] to resubmit, he had troubles identifying scientific/discipline skills and transferable [elements of the PDP], and supporting these with evidence. I spent a solid hour on his feedback. He's on the right track, but...' This comment emphasises the extra time teachers spend when assignments are of lower quality. All together, we have cut back on the time we send on giving feedback, and hence we did achieve that goal as well. Of course, it can then be discussed whether we have been giving too thorough feedback earlier, and whether the level of feedback we provide now is sufficient. Also the change of LMS at the same time as starting the peer feedback system makes results inconclusive with regards to time spent on feedback.

To sum up, the process of developing explicit criteria and testing these within the teaching team is a prerequisite for sharing clear criteria during the course. Comparing the assignments from the first cohort (September 2016) and then the following iterations of the course indicate that peer feedback needs to be an integral part of the course, so that course participants are trained in giving and receiving feedback and using the criteria. The improvement of assignments after integrating peer feedback reflects an enhanced learning environment where course participants learn from each other. The reduction in the number of assignments requiring improvement means that teachers spend less time on feedback- a personal estimate is that the time spent on feedback can be reduced from 40-60 minutes per assignment to 20-40 minutes per assignment.

The tentative conclusion is that it is possible to both increase financial sustainability and enhance the learning environment through the use of peer feedback on assignments, if formative feedback is taken a step further to formative assessment by making feedback criteria clear and shared, and making peer feedback an integral part of the course so that the feedback loop is complete and course participants are active partners in the feedback process.

Reservations to be observed are the effects of the change to a new LMS at the same time that peer feedback was introduced, and the awareness in teachers' minds that the feedback participants got from their peers makes it less critical for them to give comprehensive feedback.

Future development points

In the future it would be beneficial to incorporate more of the seven principles for good feedback outlined by Nicol and Macfarlane-Dick (2006), for instance the involvement of course participants in defining the criteria, which would align with the course's emphasis on inductive approaches. However, if we also distribute our feedback criteria we need to consider when to share these criteria with them, and avoid that they get the feeling that we 'had the answers' but did not share them. This may be a matter of sufficient meta-communication.

Even when using feedback, there is a summative element to the assessment of assignments since the teachers judge whether the PDP meets the criteria to fulfill the quality assurance set out by the PhD school and the university. In this case, feedback for students who struggle may become less formative in the sense of supporting the students' PhD process beyond the course and perhaps become more target driven as it will outline what the students need to do to meet the pass criteria for the assignment. Although the feedback in principle is formative as it helps the individual to improve the assignment, the purpose of the process changes from being life-long learning to passing the course as the student needs the credits. Further research into this would entail an analysis of the feedback provided so far, and a comparison of those who pass with those who are asked to resubmit. It is important for such a study that the analysis is retrospective, since this possible bias has not been considered previously, and therefore not taken into consideration when writing feedback.

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Blended learning for korte og specialiserede undervisningsforløb

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Faglig artikel, fagfællebedømt

> Artiklen beskriver etableringen og justeringen efter den første gennemførelse af et tre-ugers-kursus på DTU i simuleringsmodeller for sygdomsspredning. Deltagerne skal både lære de nødvendige programmeringsfærdigheder til at kunne skrive simuleringskoden, og de skal lære teori og praksis omkring simulering. Vi fokuserer her på tre udfordringer omkring dette kursus. Kurset er delt op i en off-campus-uge, hvor de studerende skal lære at programmere, og dernæst to on-campus-uger, hvor de skal lære at simulere og bruger deres programmeringsfærdigheder på en selvvalgt projektopgave. Med få justeringer blev off-campus-delen optimeret, så den understøtter on-campus-delen. De studerende fik mere fleksibilitet i arbejdstiden den første uge, og de fagligt svage studerende kunne bruge mere tid, mens kursets forløb blev varieret. Her beskrives styrker og svagheder ved gennemførelsen af kurset som blended learning. Generelt viste blended learning sig at være en udmærket metode til at give studerende og undervisere mere fleksibilitet.

Indledning

I forbindelse med en undersøgelse af publikations- og citationsmønstre inden for feltet blended learning anvender Spring & Graham (2017) en bred definition af begrebet blended learning for at få det hele med. Blended learning kan i bred forstand forstås som undervisningssystemer, der kombinerer traditionel face-to-face-undervisning med computer-medieret instruktion. Spring & Graham skriver, at overvejelser i forbindelse med design af blended learning kan omfatte en reduktion af den tid, de studerende sidder og lytter til underviseren, mængden af online-instruktion i forhold til face-to-face-undervisning samt kvaliteten af de studerendes læring, og de nævner endvidere, at blended learning som undervisningskoncept kan have andre store potentialer.

På universiteterne udbydes ofte korte kurser, hvor deltagerne tilegner sig specifik viden om et afgrænset emne. F.eks. tilbydes på DTU tre-ugers-kurser flere gange om året, hvor der arbejdes intensivt med et emne. Disse kurser er gode for ph.d.-studerende, der f.eks. skal lære at anvende en metode til brug i deres projekt. Denne type kurser tilbydes ofte som on-campus-kurser med traditionel face-to-face-undervisning. En udfordring ved denne undervisningstype, som vi vil fokusere på

her, er, at studerende, som f.eks. kommer fra andre lande, skal opholde sig på campus, i de tre uger kurset varer. Det er økonomisk tungt, og desuden kan det være svært for potentielle kursusdeltagere at afsætte hele tre uger, hvis der er forsøg eller pligter i hjemlandet. Dette kan påvirke deltagerantallet negativt på specialiserede kurser og særligt gå ud over kurser med et snævert publikum. I denne situation kan blended learning være en god løsning.

En fordel ved blended learning er, at underviserne og de studerende kan tilrettelægge undervisningstiden på en del af kurset, så det kan tilpasses andre skemaer, f.eks. laboratorieforsøg eller anden undervisning. Derudover kan det være en god motivationsfaktor for de studerende at mødes med underviserne og de andre studerende undervejs i undervisningsforløbet. On-campus-delen giver desuden underviserne mulighed for at få og give bedre feedback omkring undervisningsprocessen.

En anden udfordring, som vi vil fokusere på her, er de studerendes faglige niveau. For et traditionelt on-campus-, tre-ugers-kursus er det kritisk, at de studerende har det forventede niveau af faglig viden og færdigheder ved kursusstart. I forbindelse med et blended learning-kursus er undervisernes udfordring: Hvordan tilrettelægger man et blended learning-kursus, så de studerende gennemfører off-campus-delen og lærer det, de skal, så de er fagligt parate, når de møder op til on-campus-delen? Denne udfordring har to dimensioner. For det første en didaktisk udfordring, der handler om fordelingen af pensum mellem off-campus- og on-campus-delene. For det andet en pædagogisk udfordring, der handler om planlægning af off-campus-delen, således at de tilmeldte ph.d.-studerende på den ene side kan gennemføre off-campus-delen tilpasset f.eks. igangværende laboratorieforsøg og andre pligter og på den anden side bliver holdt til ilden i off-campus-delen. Denne tredje udfordring, at holde de studerende aktive i begge dele af kurset, vil vi også fokusere på her.

I denne artikel beskriver vi et blended learning tre-ugers-kursus, der er afviklet to gange på DTU. Vi har fokus på de pædagogiske overvejelser i forbindelse med planlægningen af kursets off-campus-del, og vi reflekterer over undervisernes observationer af de studerendes adfærd i on-campus-delen, der fører til justering og udvikling af kurset. Til slut samler vi erfaringer op og skitserer nogle undervisningsmuligheder, til næste gang kurset afvikles.

Værktøjer i blended learning

I blended learning benyttes både e-learning-værktøjer og face-to-face-undervisning. Det er vigtigt, at alle deltagerne har adgang til alle værktøjer og har styr på, hvordan de fungerer. Det er for eksempel essentielt at kommunikere opgaver og undervisningsmateriale kollektivt ud til de studerende. Dette kan gøres via en platform som dem, der findes på de fleste universiteter, hvor der oprettes en gruppe til hvert undervisningsforløb. Denne platform kan desuden indeholde et chat-rum, hvor de stu-

derende kan lægge spørgsmål op, så alle kan se dem. Dette kan bevirke, at de får svar hurtigt, hvis de andre studerende kan hjælpe med at svare, og det kan også gøre, at et svar fra underviseren hurtigt distribueres ud til alle deltagerne.

Et andet godt værktøj til blended learning er quiz- eller evalueringsværktøjer (Dellos 2015). Denne type evaluering kan bruges både i on-campus- og off-campus-delen af undervisningen. Et typisk scenarie er, at underviseren forbereder en række spørgsmål om emnet og indbygger et antal svarmuligheder i quizzen. I Kahoot benyttes ofte fire svarmuligheder. De studerende svarer på spørgsmålene (evt. på tid), og svarene kan derefter ses af både underviser og studerende. Ved anonyme quizzer kan underviseren ikke udpege de studerende og hjælpe dem individuelt på baggrund af quizzen, men de studerende ved selv, hvad de har svaret, og får på den måde en formativ feedback på deres læringsforløb og kan målrette deres fremtidige indsats på kurset. Underviseren får indirekte feedback på sin undervisning, og kan se hvor mange af de studerende der har lært det tiltænkte. Underviseren bør tage højde for resultatet i disse quizzer og vende tilbage til uklarheder, hvis der er et stort antal studerende, der ikke har lært det ønskede. Både diskussionsfora og quizzer er med til at understøtte aktive studerende i off-campus-delen, som er en af de udfordringer, vi har fokuseret på.

De studerendes motivation har selvsagt stor indflydelse på, om de klarer sig godt i denne type quiz. En af fordelene ved blended learning er netop, at on-campus-delen kan hjælpe til at motivere de studerende, da det er sværere at nedprioritere arbejde, hvis man skal mødes med folk og tale om det. Det understøtter den tredje udfordring: at holde de studerende aktive gennem undervisningsforløbet, givet deres faglige niveau, hvilket understøtter deres læring.

Præsentation af kurset og de studerende

Formålet med kurset Modellering af sygdomsspredning er overordnet at lære de studerende at konstruere og programmere simuleringsmodeller for spredning af sygdomme blandt produktionsdyr, for eksempel grise, køer, får og fjerkræ. Læringsmålene for kurset kan ses i tabel 1. Der er ikke en lærebog til kurset, men de studerende skal opbygge kendskab til en del teori og metoder for at kunne anvende simulering af sygdomsspredning fremover.

En studerende, der fuldt ud har opfyldt kursets mål, vil kunne:

1 Konstruere en simpel deterministisk simuleringsmodel af et system.

2 Konstruere en stokastisk simuleringsmodel af et system.

3 Konstruere en stokastisk og dynamisk simuleringsmodel af et system.

4 Vælge en relevant infektionsmodel til at simulere en given sygdom.

5 Modellere forskellige mekanismer til sygdomsspredning mellem individer i en population.

6 Opsamle resultater fra en simulering på en hensigtsmæssig måde.

7 Præsentere resultaterne fra simuleringerne visuelt.

8 Bruge programmet R til at bygge en simuleringsmodel.

Tabel 1. Kursets læringsmål.

Ved planlægning af et kursus må underviserne gøre sig nogle forestillinger om de studerende, der tilmelder sig. Ulriksen (2014) skelner her mellem den implicitte studerende og den empiriske studerende:

> *På det helt overordnede plan kan man sige, at den udfordring, undervisere bliver stillet over for, når de møder de studerende i undervisningen, er at erkende og anerkende, at de studerende ikke nødvendigvis svarer til det billede, de har af, hvordan de studerende burde være studerende. Eller kortere sagt: at underviseren skal håndtere, at det ikke er den implicitte studerende, som kommer til vejledningen eller sidder i undervisningslokalet; det er empiriske studerende med forventninger, forestillinger, repertoire og forudsætninger, som ikke er identiske med dem, underviseren går ud fra – men som heller ikke nødvendigvis er helt anderledes (p. 262).*

I forbindelse med etableringen af kurset Modellering af sygdomsspredning forestillede underviserne sig, at kursusdeltagerne ideelt set ville være ph.d.-studerende fra hele verden, som har stor interesse i at simulere sygdomsspredning, kan programmere flydende i R (R Core Team 2014), behersker fagsproget omkring simuleringsmodeller og har brugbare data klar til at bygge en simuleringsmodel som sidste del af ph.d.-projektet.

Hvis kurset skulle have kørt som et almindeligt tre-ugers on-campus-kursus, kunne der traditionelt set være en uge med teorien bag simuleringsmodeller, en uge med hands-on-metodeindlæring og en uge med et projekt, hvor de studerende anvender data fra deres eget ph.d.-projekt. Imidlertid er det dyrt for udenlandske ph.d.-

studerende at bo i Danmark i hele tre uger, og da de studerende kommer med mange forskellige baggrunde, er det næppe rimeligt at antage, at de alle kan programmere flydende i R. Derfor vælger underviserne at designe et blended learning-kursus med først en uges off-campus-kursus, hvor de studerende kan opholde sig i deres hjemlande, og derefter to ugers on-campus-kursus. Denne tilgang imødekommer de to første udfordringer omkring fleksibilitet for studerende fra andre lande samt at tilpasse kurset til studerende med forskelligt fagligt niveau. Med hensyn til det faglige indhold i kurset er der en naturlig opdeling mellem at lære programmering i R, som hører til "basale færdigheder", og at lære metoderne i sygdomsmodellering, som hører til "avancerede færdigheder". Off-campus-delen skal bruges på e-læring i programmeringssproget R, så alle deltagere har opnået de basale færdigheder og er fagligt parate, når de møder op til on-campus-undervisningen. Dette kursusdesign giver fleksibilitet for de studerendes i forhold til deres faglige niveau i R: Studerende, der har gode færdigheder i R, kan klare kursets første uge med en relativt lille indsats. På den måde får de mere tid ved siden af kurset til at lave eventuelt laboratoriearbejde i deres ph.d.-projekt. Studerende, der ikke har tilstrækkelig gode færdigheder i R, må lægge en større indsats i at lære programmeringssproget i løbet af den første uge.

Et blended learning-kursus i Modellering af sygdomsspredning

Herunder beskrives nogle af de erfaringer, vi har gjort os, i forbindelse med de to gange kurset Modellering af sygdomsspredning har været afviklet. Kurset er opdelt i tre hoveddele, fordelt på tre uger (Tabel 2) Vi har kaldt overskrifterne på de tre uger for hhv. e-learning, spiral learning og project-based learning. I praksis er der dog et overlap, da projektet i sidste uge er indbefattet i spiral learning fra ugen før. E-learning er et bærende element i den første uge, men danner samtidig starten til spiral learning, der kommer i uge to (se referencen Modellering af sygdomsspredning 2017).

	Uge 1	Uge 2	Uge3
Sted	Off-campus	On-campus	On-campus
Metode	E-learning	Spiral learning	Project-based learning
Emne	Programmering + start på simulering.	Simulering: teori, praksis, metoder, præsentation af resultater.	Projekt: Simulering + præsentation af resultater. Eksamen på sidste dag.

Tabel 2. Oversigt over kursets dele

Først skal de studerende lære at kode i programmeringssproget R. Det er ikke alle studerende, som på forhånd har erfaring med at programmere, men det er en fordel, hvis man har kendskab til programmering. Dernæst skal de studerende lære om teorien bag og opbygningen af simuleringsmodeller for sygdomsspredning. Der er flere tilgange til emnet, og dette kursus fokuserer på mekanistisk simulering. Underviserne har valgt *spiral learning*-konceptet, hvor der i princippet undervises i det samme stof hver dag, men hvor metoder og opgaver gradvist udvides, så det bliver mere og mere kompliceret (Kolb & Kolb 2009). *Spiral learning* egner sig efter vores mening godt til at lære praktiske færdigheder i programmering, da de studerende undervejs kan vænne sig til programmeringssproget og metoderne og på den måde opbygge deres egne erfaringer gradvist. I den sidste uge skal de studerende bruge deres nye færdigheder til at bygge deres egen simuleringsmodel. Dette gøres som *project-based learning* i mindre grupper (Krajcik og Blumenfeld 2006). Det vil sige, at de studerende selv definerer deres projekt inklusive hypoteser, metoder og løsninger. Der er selvfølgelig krav om, at de nye færdigheder skal bruges i løsningen af opgaven. Desuden er underviserne til rådighed under hele forløbet. På den sidste dag er der eksamen, hvor grupperne præsenterer deres projekt for underviserne og de andre grupper.

Kursusdeltagerne har indtil nu overvejende været ph.d.-studerende fra det veterinære og humane område, som vil arbejde med sygdomsspredning i forskellige populationer. Kurset er et specialiseret kursus, som fokuserer på et snævert emne, som også delvist kan findes (omend mere overfladisk) i andre kurser. Derfor er deltagerantallet lille. Det første år kurset blev kørt, var der 12 studerende, og det andet år var der 6 studerende.

Første uge: Off-campus-del

I den første uge af kurset skal de studerende arbejde ca. 37 timer. Det primære formål er at opdatere deres viden omkring programmering i R samt introducere de første begreber omkring simulering. De studerende modtager opgaver online via undervisningsplatformen og skal individuelt løse dem. Opgaverne er små praktiske opgaver, hvor de studerende vænner sig til programmeringssproget ved at udregne eksempler, overvejende i pakken "Swirl" i R. Den studerende får en respons for hvert eksempel, om udregningerne er korrekte, og man får først lov at gå videre til næste opgave, når den forrige er løst rigtigt.

Kurset er relativt nyt og har kun kørt to gange, og vi beskriver herunder de erfaringer, vi har gjort os, og de justeringer, vi har foretaget.

Den første gang kurset kørte, fik deltagerne ikke nogen opgaver, der skulle afleveres, men kun teoretiske og praktiske opgaver, der skulle løses på egen hånd. Som didaktisk metode kan dette karakteriseres som selvstudium, idet det er de studerendes

eget ansvar at arbejde med opgaverne for at lære de nødvendige programmerings-færdigheder. Dette selvstudium bevirkede, at mange af de studerende ikke havde nået at løse alle opgaverne, fordi de enten mente, at de godt kunne klare dem i forvejen, eller at de ikke havde tid. Ydermere oplevede vi, at de studerende havde svært ved at administrere tiden, så mange sad og kæmpede med opgaverne til allersidst inden uge 2. Derfor justerede vi kravene til *anden gang,* kurset skulle køre. Her skulle de studerende aflevere korte svar på en række spørgsmål per mail hver dag i den første uge. Didaktisk set er der her tale om selvstudium med daglig rapportering til underviserne. Dette didaktiske greb medførte, at de fleste studerende sendte svarene ind hver dag. Der skulle besvares omkring tre spørgsmål per dag, og vi fandt ud af, at der er flere fordele i at spørge bredt. For eksempel blev de studerende spurgt om niveauet af dagens undervisning, om det var svært eller let. De skulle svare i et udsagn på maks. tre linjer. Det skabte desuden mere kommunikation mellem studerende og undervisere, hvilket øger motivationen hos begge parter. På den måde får underviserne feedback, en dybere indsigt i de studerendes motivation og færdigheder, da de ikke bare kunne svare "let", men skulle uddybe lidt mere. Disse svar kunne desuden bruges til at spørge nærmere ind til de studerende, hvis de havde problemer med nogle opgaver. Derudover blev de studerende på den måde nødt til at reflektere over deres læring. Denne form for feedback fra studerende til underviser er blandt de mest effektive undervisningsmetoder (Biggs & Tang 2011, tabel 4.1). Alle studerende havde løst opgaverne i den første uge, da de mødte op i uge 2, hvilket ikke var tilfældet, det første år kurset kørte.

En anden god effekt ved at få de studerende til at sende korte svar på opgaverne hver dag er, at underviseren får et godt indblik i niveauet. For eksempel var et af spørgsmålene at beskrive deres oplevelse af opgaverne den dag. Nogle studerende beskrev det som kedeligt og elementært, og andre beskrev det som svært. Det var på den måde muligt at have ekstra fokus på dem, som havde det svært, og per mail give faglige vink og motivere dem til at arbejde mere med stoffet, inden de mødte op i uge 2. Dette ville være umuligt, hvis ikke de skulle aflevere opgaver i den første uge, og det viser, at off-campus-undervisning kræver, at undervisningen er gennemtænkt mht. feedback og motivation.

Anden uge: On-campus-del

I den anden uge undervises de studerende på universitetet. Denne del af kurset er traditionel face-to-face-undervisning, hvor underviserne præsenterer teorien, og derefter løser de studerende praktiske opgaver i programmering. *Den første gang* kurset kørte, var der overvejende undervisning ved forelæsninger om programmering og metoder til at implementere teori i praktiske opgaver. Underviserne forsøgte at programmere direkte i klasselokalet. Ideen med denne "live-kodning" var, at de studerende skulle følge tænkemåden og progressionen i fremgangsmåden ved kod-

ning. Imidlertid begyndte de fleste studerende at kopiere koden, efterhånden som den blev skrevet. Det understøtter ikke *deep learning* (Biggs & Tang 2011) bare at skrive af, og derfor måtte konceptet ændres. *Den anden gang* kurset kørte, blev forelæsningerne holdt til korte sessioner af 15 til 30 minutter, hvorefter de studerende fik udleveret kode og opgaver. De sad så selv i grupper og løste opgaverne hele dagen, mens underviserne gik rundt og hjalp. Det gav god dialog med de studerende og bevirkede, at de skrev deres egne programmer med deres egne kommentarer og kunne bruge deres viden i praksis. Det vil sige, at de studerende blev understøttet i at vælge en *deep learning*-tilgang. Underviserne fik på den måde løftet undervisningen og læringen op til et højere niveau på både vidensskalaen og skalaen om den kognitive proces i Blooms reviderede taxonomi (Anderson et al. 2001).

På DTU anvendes Blooms taxonomi i forbindelse med formulering af læringsmål for kurser. Blooms originale taxonomi opererer med seks niveauer for kognitiv læring: Knowledge, Comprehension, Application, Analysis, Synthesis og Evaluation. De seks kategorier er ordnet fra simpelt til komplekst og fra konkret til abstrakt. Det antages endvidere, at taxonomien repræsenterer et kumulativt hierarki, det vil sige, at den studerende skal mestre et niveau, som forudsætning for, at den studerende gennem undervisning og læring kan bevæge sig op på det næste niveau (Krathwohl 2002). Ulriksen (2014) skriver om Blooms originale taxonomi:

> *En bevægelse op gennem taxonomien handler derfor dels om en stigende grad af bevidsthed og eksplicit refleksion, dels om en stigende grad af selvstændighed. Derimod står der ikke noget særligt om det indhold, man arbejder med. Det er individets behandling og mestring af indholdet, som er i centrum (p. 111).*

Den reviderede Bloom taxonomi (Andersson et al. 2001) udfolder læring i to dimensioner, nemlig en kognitiv dimension og en vidensdimension. I den kognitive dimension er der ligesom i den originale Bloom taxonomi seks niveauer, men niveauerne udtrykkes ved verber, og de to øverste niveauer har skiftet hierarkisk plads. Niveauer er således: Remember, Understand, Apply, Analyze, Evaluate og Create. I vidensdimensionen opereres der med fire typer af viden: Factual knowledge, Conceptual knowledge, Procedural knowledge og Metacognitive knowledge. Krathwohl (2002) beskriver de fire typer af viden på følgende måde:

> *Factual knowledge: The basic elements that students must know to be acquainted with a discipline or solve problems in it. Conceptual knowledge: The interrelationships among the basic elements within a larger structure that enable them to function together. Procedural knowledge: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods. Metacognitive knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition (p. 214).*

	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual knowledge						
Conceptual knowledge			4			
Procedural knowledge			6,7			1,2,3,5,8
Metacognitive knowledge						

Tabel 3. Blooms reviderede taxonomi. Læringsmålenes placering er angivet nummereret som tidligere beskrevet.

Tredje uge: Projektarbejde on-campus

I kursets tredje uge arbejder de studerende i tomandsgrupper. De skal selv have defineret deres *case* i løbet af de første to uger. På den første dag i den tredje uge bliver de bedt om at lave en tidsplan for, hvordan de vil gennemføre projektet, så de når rundt om alle de ting, der er nødvendige. Der har været vidt forskellige grupper med varierende grad af færdigheder og motivation. Det er vores erfaring, at grupper, som virker svage i programmering, vokser med opgaven i den tredje uge. På den måde fungerer *project-based learning* rigtig godt i det sidste intense forløb af kurset. De studerende dykker atter ned i de teoretiske metoder, de har lært i de to første uger, og lærer her på et dybere niveau at bruge dem. Det vil sige, at de dykker dybere ned i Blooms reviderede taxonomi, hvor de lærer at anvende og skabe på "procedural knowledge"-niveau (Tabel 3).

I løbet af den tredje uge har de studerende mulighed for vejledning af en af underviserne én eller to gange dagligt i ca. en halv times tid. Vores erfaringer viser, at det er vigtigt, at underviserne ikke er til rådighed hele tiden, så det faciliterer diskussion i gruppen, hvilket understøtter den dybe læring. Omvendt er det også vigtigt, at de studerende forholdsvis ofte har mulighed for at stille spørgsmål, så de ikke bruger for lang tid på noget, de kan få hjælp til. Det er en balance, og det virker, som om en til to gange om dagen er passende.

På den sidste dag fremlægger de studerende deres projekter for underviserne og de andre studerende. Der er to personer i hver gruppe, og hver person skal til eksamen præsentere et mindre område af det fælles projekt, som de har defineret og undersøgt. Dette gør, at hver person kan eksamineres individuelt.

Hvad har vi lært, og hvad skal ændres?

Et vigtigt element i forbindelse med at designe kurset var vores forestilling om de studerende, der ville tilmelde sig. Vores "implicitte studerende" var ph.d.-studerende

fra hele verden, som har stor interesse i at simulere sygdomsspredning og kan programmere flydende i R, behersker fagsproget omkring simuleringsmodeller og har brugbare data klar til at bygge en simuleringsmodel som sidste del af ph.d.-projektet. De to gange kurset har kørt, har der været få studerende, som har passet ind i vores forestilling. Som Ulriksen (2014) skriver, var deltagerne, *"ikke [...] identiske med dem, underviseren går ud fra – men [...] heller ikke nødvendigvis [...] helt anderledes".* Vi har erfaret, at den typiske empiriske studerende er en ph.d.-studerende, som har lille erfaring med R, ikke er bekendt med fagsproget indenfor simuleringsmodeller, har ukomplette data klar, men en vag idé om, hvordan de kan bruges til at skabe en simuleringsmodel. Der har endda været tilfælde af studerende, som virkede, som om de mest havde valgt kurset for at få de sidste ECTS-point til at gennemføre deres ph.d.-studium. Hvis de studerende reelt ligger langt fra den implicitte studerende, vil det stille større krav til fleksibilitet hos underviseren for at tilpasse undervisningen undervejs. Vi har tidligere nævnt to vigtige værktøjer, der kan bruges i blended learning: diskussionsfora og quizzer i undervisningen. Disse værktøjer kan bruges til at øge motivationen hos studerende, måske specielt dem, der ligger langt fra den implicitte studerende. Under hele kurset havde de studerende adgang til et online-diskussionsforum. Det blev dog i praksis brugt meget lidt, da kommunikationen mellem undervisere og studerende foregik per mail, og det fungerede udmærket. Quizzerne blev derimod brugt flittigt i kursets on-campus-del (Tabel 2). De studerende var glade for det opbrud i undervisningen, det gav, og det hjalp dem til at holde sig aktive ved at give variation. Den formative feedback, som giver den studerende et indblik i, hvor han/hun ligger i forhold til undervisningsforløbet, var til gavn for de studerende, så de, der lå svagest, brugte mere tid på at gennemgå materialet efter undervisningen. Desuden gav quizzerne underviseren et godt indblik i, om de studerende havde fanget vigtige pointer. Det var derfor nemt at vende tilbage og "samle op" på de pointer, som nogle studerende havde misset i løbet af undervisningen. Dette er specielt vigtigt i forhold til udfordring nummer to, som vi fokuserer på her: at undervise studerende med forskelligt fagligt niveau.

For at øge den aktive deltagelse og læring i forbindelse med de afsluttende fremlæggelser bør studerende, når de er tilhørere, stille mindst ét kritisk spørgsmål til det hold, der fremlægger. Det at forholde sig til en fremlæggelse, formulere mindst ét kritisk spørgsmål og stille det i plenum gør, at tilhørerne må dykke endnu længere ned i Blooms reviderede taxonomi på det meta-kognitive niveau, fordi de må være bevidste om deres indlærte viden og bruge den til at stille spørgsmål til de andre. Det vil blive implementeret i kurset fremover.

En ulempe ved blended learning er, at underviseren skal kunne overskue to typer undervisningsforløb og forhåbentlig opnå synergi mellem dem. Dette kræver ekstra forberedelse. En anden ulempe er, at de studerende skal kunne overskue både den elektroniske undervisning og face-to-face-undervisning i det samme forløb. Det er

her vigtigt, at undervisningsmaterialer ensrettes og sendes ud rettidigt, ligesom det er tilfældet med alle andre undervisningsforløb. Blended learning giver underviseren en udfordring ved, at der skal undervises på flere forskellige måder, samtidig med at de studerende skal understøttes, så de er aktive og opnår læringsmålene. Vi har her skitseret en løsning på dette, som giver et varieret undervisningsforløb, hvor de studerende er aktive, og der er en kontinuert feedback mellem studerende og underviser.

En af styrkerne ved blended learning er, at de studerende ikke behøver være fysisk til stede under hele undervisningsforløbet. Det giver øget fleksibilitet til f.eks. laboratorieforsøg eller familieliv. Det er desuden dyrt at bo i et land som Danmark, og derfor kan to uger on-campus i stedet for tre uger betyde, at flere studerende fra udlandet kan få lov at deltage. En anden styrke er, at blended learning giver mulighed for at undervise studerende, som kommer med forskellige faglige niveauer. De kan i den første uge bringes til samme niveau, og på den måde optimeres on-campus-undervisningen (Tabel 2). En tredje styrke er, at undervisningsforløbet er varieret og derfor måske ikke opleves ensformigt for de studerende. Det understøtter en dybere forståelse af emnet, at indlæringen sker med forskellige metoder. Blended learning passer desuden godt ind i en moderne forståelse af undervisning og læring, som går ud på, at de studerende ikke passivt kan indlære færdigheder (i det øverste venstre hjørne af Blooms reviderede taxonomi), men skal arbejde aktivt på forskellige måder, så de opnår en dybere forståelse af emnet og færdighed i løsning af simuleringsopgaver.

I det beskrevne undervisningsforløb benyttes først en uges off-campus- og dernæst to ugers on-campus-undervisning (Tabel 2). Kursets faglige indhold har været fordelt således, at de "basale færdigheder" opbygges gennem en uges off-campus computer-medieret instruktion, mens de "avancerede færdigheder" opbygges og efterfølgende anvendes på et relevant case i kursets on-campus-del. De basale færdigheder, som de studerende skal lære, er de nødvendige programmeringsfærdigheder i R, hvilket i forhold til Blooms reviderede taxonomi (Tabel 3) kan ses som "factual knowledge/create": De studerende skal forstå R's syntaks og semantik, men de studerende behøver ikke vide, hvorfor R er et godt valg som programmeringssprog (conceptual knowledge) og heller ikke kunne skrive et program (procedural knowledge/create) til sygdomsmodellering. De "avancerede færdigheder", der er udtrykt gennem kursets læringsmål (Tabel 1) og indplaceret i forhold til Blooms reviderede taxonomi (Tabel 3), opbygges i kursets on-campus-del ved face-to-face-undervisning og gennemførelse af et projektarbejde under vejledning ud fra de studerendes selvdefinerede case.

Der er dog ikke noget i vejen for at vælge en anden fordeling mellem on-campus- og off-campus-undervisning. For eksempel kunne tre-ugers-kurset i simuleringsmodel-

ler for sygdomsspredning bestå af først en uges off-campus-undervisning med træning af basale programmeringsfærdigheder i R ved selvstudium med daglig rapportering til underviser, dernæst en uges on-campus-undervisning i metoderne i sygdomsmodellering og i at opbygge en simuleringsmodel og til sidst en uges off-campus-undervisning igen, hvor de studerende selvstændigt definerer en case, der er relevant for deres ph.d.-studium, og gennemfører et projektarbejde med konstruktion af en passende stokastisk og/eller dynamisk simuleringsmodel. Dette ville gøre undervisningen endnu mere fleksibel for deltagerne. I alle tilfælde er det vigtigt, at underviseren tager højde for udfordringerne ved de forskellige undervisningstyper og tilrettelægger undervisningen og kursusindholdets fordeling omhyggeligt.

Som konklusion kan vi konstatere, at det er lykkedes at bruge blended learning i dette kursus på en måde, så vi imødekommer de tre udfordringer med (1) fleksibilitet for de studerende, (2) at tage højde for de studerendes individuelle faglige niveau, samt at (3) sikre aktive studerende gennem undervisningsforløbet.

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A Virtual Veterinary Emergency Clinic – investigation of students' perceptions and self-efficacy beliefs

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Research article, peer-reviewed

At the University of Copenhagen, companion animal emergency medicine is taught in a clinical environment after students' completion of basic theoretical and clinical courses. Students are often anxious about emergency shift participation and the prospect of being the responsible veterinarian in emergency situations. This study aimed to investigate whether inclusion of virtual patients in addition to real-life patients would increase students' perceived self-efficacy in emergency medicine. Sixty-seven students were divided into two groups, one of which participated in regular emergency rotations, while the other also learned in a Virtual Emergency Clinic (VEC). Participating students were given a questionnaire regarding course experience and self-efficacy, with responses on a 10-point Likert scale. The VEC group expressed a higher level of knowledge and significantly higher level of exposure to and ability to handle emergency patients. In addition, virtual problem-based learning appeared to increase veterinary students' self-efficacy with regard to managing emergency patients in their future careers.

Introduction

Companion animal emergency medicine is the study of critical illness, its diagnosis and therapy in dogs, cats and exotic pets. In general, this topic is taught in a clinical environment, and students must complete basic theoretical and clinical courses before participating in emergency situations. However, the transition from theory to

practice is never an easy one to undertake, and emergency medicine poses a special challenge in this regard. Students may be theoretically equipped for clinical work, but, in the emergency room setting, they must be able to take immediate action, mastering the necessary skills as well as having the theory present in mind. The life-or-death nature of the work is stressful, and many students are, therefore, anxious about emergency shift participation and the prospect of being the responsible veterinarian in similar situations in the near future once they graduate. In a learning situation this is critical, as stress and anxiety can have a negative impact on learning (Evans, Gerlach, & Kelner, 2007; Eysenck, 1979; Fredrickson & Branigan, 2005). Accordingly emergency medicine is an area of work in which the student must acquire self-efficacy in order to not fear the tasks they face. The theory of self-efficacy (also known as mastery expectations) refers to a student's own expectation of whether or not he/she has the competences to succeed in a given assignment (Bandura, 1977, 2012). Working towards specific goals and having a satisfactory amount of time to achieve them has been demonstrated to increase self-efficacy in the student (Schunk & Mullen, 2012). Therefore, creating an emergency medicine course with an environment that nourishes self-efficacy is a goal worth pursuing.

At the Department of Veterinary Clinical Sciences, University of Copenhagen, companion animal emergency medicine is taught in a fourth and fifth year master course and is one of the department's core courses during which students are introduced to practical work in the clinic.

The overall learning objectives of the course are for the student to achieve knowledge, skills and competences for examining, diagnosing and treating critically ill animals. To achieve these aims the course has a practical part in which the individual student participates in day, evening and night shifts at the emergency service of the University Hospital for Companion Animals (UHCA) under guidance of a qualified veterinarian. Prior to course participation, students have completed all basic theoretical clinical courses of veterinary medicine and are, therefore, theoretically equipped for clinical work. The course strives to create a setting in which the student's opportunity to gain self-efficacy is optimized by setting specific goals: performing a problem-oriented medical work-up, reaching a diagnosis and setting up a treatment plan for their patients. However, because of the nature of the emergency situation, there is a great variety in the number and type of patients the individual student is presented with during the course. Consequently, some students may qualify as veterinarians without having had any experience with certain critical diseases in dogs and/or cats. For the new graduate, this is an unsatisfactory, stressful and potentially dangerous situation that must be considered pedagogically, so that students can graduate with the necessary level of knowledge, experience and self-efficacy.

Thus, in order to provide students with access to the most relevant companion animal critical cases, a virtual emergency clinic was created at UHCA where the actual practical emergency shifts take place.

The so-called virtual clinic is a relatively new phenomenon in veterinary education (de Bie & Lipman, 2012). It can best be described as a traditional problem- (and paper-) based case simulation, which has evolved into an interactive, computer-based scenario. Thus, in the virtual clinic, the program simulates clinical scenarios, in which the learner acts as the veterinarian, gathering information (history, clinical findings), diagnosing and treating (Huang, Reynolds, & Candler, 2007). To our knowledge, only a few veterinary virtual clinics deal with emergency cases (Dale, Mcconnell, Short, & Sullivan, 2005; Schlachter, 2004), which is unfortunate, as one of the advantages of simulation is the ability to provide a stress-free learning environment, something that the real-life emergency clinic lacks.

The aim of this study was to investigate whether inclusion of virtual patients in addition to the real-life emergency patients at the UHCA would lead to an increase in students' perceived self-efficacy in dealing with emergency patients.

Materials and methods

Setting

The study took place at UHCA during the fourth and fifth year master course, 'Emergency Medicine, Obstetrics, Critical Care, and Clinical Anesthesiology' (EOCA), prior to and following curricular implementation of the Virtual Emergency Clinic (VEC). The emergency medicine rotation within this course consists of 1) an introduction week, during which 30-40 students participate in lectures and skills lab practice and 2) one week of companion animal emergency clinical work during which one or two students at a time participate in day, evening and night shifts. During the nine-week course, there are eight individual emergency rotations in total. The EOCA course is offered twice per semester and has a written final exam (multiple choice). The study was carried out during two of the courses provided in 2015.

The Virtual Emergency Clinic

The VEC was developed as an online case-based training simulation in the open source Content Management System (CMS) Drupal (www.drupal.org). Drupal is based on a 'core' system for development of interactive web sites that can be extended through a large number of add-on 'modules'. In the VEC we have, for instance, extended the core systems with functionality for image galleries and for zooming large images (e.g. to allow for examination of X-ray images). Another module records the choices students take when requesting more information about a case, and examining and diagnosing the animal. When the student has completed

the case, he/she will be presented with an overview of the time spent and actions taken.

The VEC is set up to mimic the UHCA where the real-life emergency shifts take place. Thus the VEC has a reception area, a consultation room, a pharmacy, an intensive care unit, imaging unit, anesthesia unit, surgical unit, etc. with photos of these locations from the actual hospital. The student acts as the veterinarian in charge with full responsibility for the (virtual) emergency patients. The patients must be examined, diagnosed and treated. For each patient a medical history is provided, and, while the student does not physically examine an actual patient, he/she gets access to the clinical findings that a proper clinical exam would result in. Subsequently students must apply their theoretical knowledge and carry out a diagnostic work-up of the patient in a problem-oriented manner, interpret test results (blood samples, radiographs, etc. which are available to the student independently of whether they are abnormal or relevant for the case), choose the proper therapeutics, provide client information and write the patient's medical record. A case may take one to two hours to complete, not unlike the time spent on the initial work-up of a patient in the clinic. At the end of the course the students receive a synopsis for each case in which the patient's diagnosis is revealed, and the hospital's suggestion for a correct patient work-up is provided. The student can then compare this synopsis with their own medical record for the patient. At present, no individual, personal feedback is provided, but students are encouraged to ask instructors for elaboration on their results.

Participants

Twenty-nine students participated in the first EOCA course in the spring of 2015 and were designated to the 'No VEC' group. This group completed the course in the traditional manner based on patient intake in the hospital and with no access to the VEC. Thirty-eight students participated in the second EOCA course and were designated to the 'VEC group'. During the introduction week, a thorough demonstration of the e-learning program was given, and written instructions were supplied. Each student was to access the VEC on-line and complete four virtual patient cases, write a medical record for each case and send these to the course instructor before the end of the rotation. Prior to the EOCA course both groups had participated in a general practice course at the same hospital, but had not yet encountered critically ill or emergency cases. All students volunteered to participate in the study, which was approved by the Veterinary Study Board at the University of Copenhagen. Three students who participated in the course prior to initiation of the study had volunteered to be interviewed before and after their course in order to clarify students' perceptions of their self-efficacy in relation to emergency medicine and to obtain information that could identify key subjects to be included in a questionnaire.

Questionnaire

Based on findings from the interviews, a questionnaire was created (Appendix 1), including four main statements regarding issues related to course experience and to self-efficacy. Responses were given on a 10 point Likert scale, where 1=I don't agree at all, and 10=I fully agree. Additional questions were added in order to clarify if the two groups were comparable with regards to experience and ambition related to companion animal practice. After completion of the course exam the questionnaire was provided to all students included in the study. At the end of the questionnaire, students were free to comment and (for the VEC group) further elaborate on their perception of the VEC.

Statistical analysis

Similarity between groups was compared using a Chi Square test. The Likert scale scores of the two groups, 'VEC' and 'No VEC' regarding the four main statements were compared using a Mann Whitney U test. Statistical significance was defined as $P<0.05$.

Results

Based on the results regarding experience and interest in companion animal practice, group comparability was considered acceptable (Table 1).

Student group	No VEC	VEC	X2 (df)	P value
Number of students	29	38		
Response	16/29 (55.17%)	26/38 (68.42%)	1.234 (1)	0.267
Prior companion animal practice experience	3/16 (18.75%)	3/26 (11.54%)	0.421 (1)	0.517
Interest in working with companion animals	9/16 (62.5%)	13/26 (50%)	0.155 (1)	0.694

Table 1. Study groups VEC and No VEC: Companion animal experience and interest. VEC = virtual emergency clinic; X2 = chi square statistic; df = degrees of freedom.

Results from the questionnaire's four statements are illustrated in Figure 1-4. For each statement, students expressed their level of agreement on a scale from 1-10.
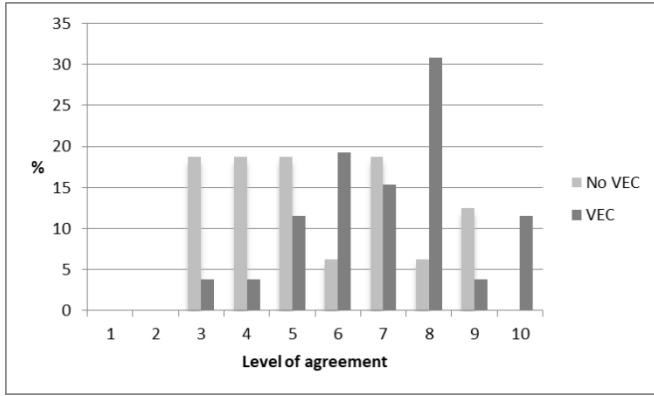
Figure 1. Students' level of agreement with the statement:
I have been introduced to a wide range of emergency patients.
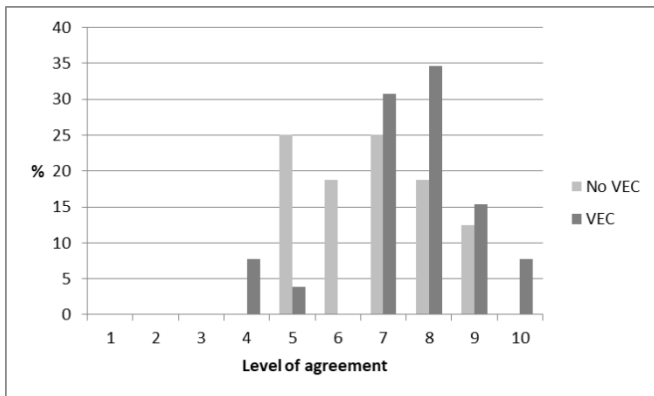
Figure 2. Students' level of agreement with the statement:
I have gained knowledge of how to approach the emergency patient.
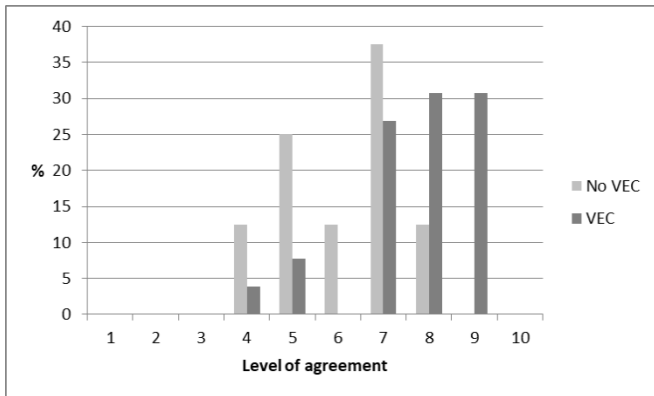
Figure 3. Students' level of agreement with the statement:
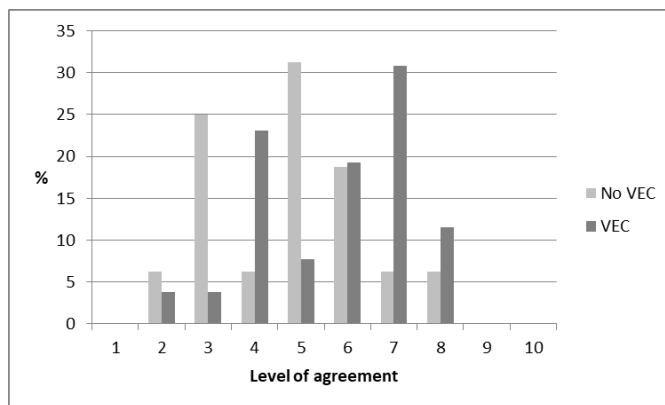*I feel ready to handle emergency patients under supervision.*

Figure 4. Students' level of agreement with the statement:
I feel ready to handle emergency patients as a qualified veterinarian.

In all four statements we found a shift towards a higher level of agreement when students had access to the VEC (Table 2).

Statement	Median (range)	P value
1) I have been introduced to a wide range of emergency patients	No VEC: 5 (3-9) VEC: 7 (3-10)	0.025
2) I have gained knowledge of how to approach the emergency patient	No VEC: 7 (5-9) VEC: 8 (4-10)	0.061
3) I feel ready to handle emergency patients under supervision	No VEC: 6.5 (4-8) VEC: 8 (4-9)	0.001
4) I feel ready to handle emergency patients as a qualified vet	No VEC: 5 (2-8) VEC: 6 (2-8)	0.065

Table 2. Difference in level of agreement on a Likert scale in VEC and No VEC groups. VEC = virtual emergency clinic.

From a knowledge and experience point of view, the findings show that VEC group students expressed a higher level of knowledge and significantly higher level of exposure regarding the emergency patient than the No VEC students (Statements 1 and 2). From a point of view related to self-efficacy, the results demonstrate that, in general, students from the VEC group considered themselves more able to handle emergency patients, than the No VEC group students (Statements 3 and 4), the difference being significant with regards to managing patients under supervision (Statement 3).

Ten students from the VEC group had commented on their experience with the VEC. These comments can be seen in Table 3.

Comment
The [virtual] cases have given me the opportunity to think through even more scenarios.
The real emergency calls provided a small, but useful insight into the kind of patients you must be able to treat in an emergency situation. E-learning provided a more varied and broad picture of the acute cases.
I really liked the E-learning, because it was useful as a kind of repetition of the individual types of emergency cases, and I used that as preparation for my exam.
Nice, relevant [e-learning] cases. They took me longer than I had expected. It made me contemplate how I would approach an emergency patient (which tests and why).
E-learning cases were a really nice way to get access to some patients that you didn't necessarily meet in the emergency room!
Because I had very few patients [in the emergency room], e-learning was a very important factor, providing me with cases.
I also think the e-learning cases were useful, because they provided you with the opportunity to dig into some subjects by using e-learning instead of hard-core reading. Therefore, I would have liked a couple of more cases, so that one could learn about more subjects.
I think e-learning has been a great idea, and I'm sure it will be fine when more drugs, procedures, prices, etc., are added.
E-learning cases made you feel that you didn't miss so much!
There wasn't really any feedback, but that was okay as long as the synopses were elaborate and suggested different options regarding treatment.
The game could be improved by making it possible to see, during the existing cases, if a chosen treatment is wrong.
E-learning was mostly just practicing the problem-oriented medical record system, while at the same time one could repeat the different subjects. But it has the potential to become a fun way of learning, if – in the future – one doesn't have to write down the entire medical record, but instead could concentrate on learning the facts.
I probably should have made the cases before participating in the emergency rounds – partly because then I would have been prepared for some of the real emergency cases, partly because I would then have had the chance to ask for advice in relation to some of the [virtual] cases that I had trouble with. It would have been useful with a one-hour case session, giving us the opportunity to ask questions, because there were many questions that didn't come up until after you had worked with the cases.
If you want to use E-learning cases it's probably a good idea to improve the introduction. An improved intro with a demonstration of the different options, maybe including a specific case for practice – that would have been awesome.

Table 3. Comments by students from the VEC group. VEC = Virtual Emergency Clinic.

Discussion

Creation and integration of a useful virtual reality simulator into a veterinary curriculum is not an easy task. The technical challenges are considerable, and uploading as well as maintenance of relevant data is a great and often on-going effort (Dhein, 2005). The pedagogical challenge is equally large. When considering the time and effort that goes into creating a virtual clinic, it is essential that the pedagogical outcome is worth it.

In the current study we aimed at increasing students' self-efficacy in dealing with companion animal emergency patients by introducing a virtual clinic into an emergency medicine course. Self-efficacy is best described as a 'situation-specific confidence' – a person's belief that he/she can perform a specific task, in this case the student's belief that he/she is able to correctly handle emergency patients. There are four main sources of self-efficacy: experiencing success, vicarious experience, verbal persuasion and a psychological factor (Bandura, 1977). In the present study the experience of success (through independently diagnosing and treating a virtual patient) and the psychological factor (doing so in an environment from which the anxiety of dealing with life and death has been removed) were the main foci for improving self-efficacy. In a learning situation, high self-efficacy is desirable because it is associated with high intrinsic motivation, an eagerness to engage in a course of action and, as a result, better performance (Bandura, 1977; Lane, Lane, & Kyprianou, 2004; Rea, 2000). Our results demonstrate that students with access to the VEC have higher levels of self-efficacy and a perceived higher level of knowledge and experience than students without this option. Thus, the VEC seems to accommodate a pedagogical need. However, there is always a risk of a false sense of confidence, especially following the experience of success, when using simulation as a substitute for the unpredictable real-life situations (Clanton et al., 2014; de Bie & Lipman, 2012). In view of this, it may be seen as a positive finding in our study that no students *fully* agreed (level 10) to the statements related to self-efficacy. There still was room for some amount of self-doubt.

Scalese and Issenberg in 2005 proposed ten features in medical simulation of which the majority must be present for effective learning to occur (Scalese & Issenberg, 2005): a) Feedback is provided during the learning experience; b) Learners engage in repetitive practice; c)The simulator is integrated into the curriculum; d) Learners practice with increasing levels of difficulty; e) The simulator is adaptable to multiple learning strategies; f) The simulator provides clinical variation; g) The simulator is embedded in a controlled environment; h) The simulator allows individualized learning; i) Outcome measures are expressed clearly; and j) The simulator is a valid approximation to clinical practice. When evaluating the VEC the majority of features are, in fact, present, though this simulator is not adaptable to multiple learning

strategies (e), the learner does not practice with increasing levels of difficulty in the current version (d) and no individual feedback is presently provided during the learning experience (a).

It is well-known that feedback is fundamental to learning (Hattie & Timberly, 2007), and its lack in the VEC therefore deserves attention. The goal of feedback is to provide students with insight into their performance in order to optimize its quality (Clynes, MP & Raftery, SEC, 2008; Cantillon, P & Sargeant, J, 2008). According to Ovando (1994) feedback should be 'relevant, immediate, factful, helpful, confidential, respectful, tailored, and encouraging' in order to obtain this goal. At this point in time VEC provides response to the students in the form of a written synopsis for each case. This not only gives the student an example of a veterinarian's problem-oriented approach to the given patient, but also provides an example of a medical record in the format that students are taught in the hospital. However, although it fulfills some of the requirements of Ovando (1994), it might not be considered regular feedback. Most importantly, it is not immediate, but is uploaded to the student at a later time. The student must then compare the synopsis with their own medical record in order to assess their own performance. Immediate feedback has been shown to be essential for optimal gain in game-based learning (Kiili, 2005), and it is, therefore, obvious that the next step for improving the VEC is to prioritize inclusion of feedback during the training simulation. By personalizing feedback, encouraging students' progress, students would furthermore be provided with verbal persuasion, which is another source of self-efficacy, as previously mentioned (Bandura, 1977).

It would, undoubtedly, be optimal if each student was able to participate in a greater number of emergency shifts and receive more hands-on experience. In the VEC an obvious disadvantage is the lack of opportunity for the student to personally examine the patient involved. Instead the students must rely on information provided by a computer. During their clinical emergency rotations, students become part of the clinical environment and members of the emergency team, thereby developing their skills in a classical situated learning experience (Lave & Wenger, 1991). Additionally, this provides them with vicarious experience which is also a source of self-efficacy (Bandura, 1977). Thus, the virtual patients are not a replacement for the important hands-on skills of the veterinarian, but a supplement which allows the student to work with every other aspect of clinical work in different patients, be it choice of diagnostics/therapeutics or interpretation of test results. From the findings in this study, including students' comments, it is clear that the VEC is, in fact, able to provide students with a feeling that they have encountered a wide variety of emergency cases.

Rather than simply providing these additional emergency case examples through lectures, working with virtual patients not only allows for problem-based learning (Albanes MA & Mitchell S, 1993), but also stimulates students emotionally. Thus, sev-

eral studies have shown that learning through simulating and playing a game adds to a student's experience of flow – an emotional state that enhances learning (Admiraal, Huizenga, Akkerman, & Ten Dam, 2011; Beylefeld & Struwig, 2007; Csikszentmihalyi, 1996). Achieving flow requires a balance between challenge and skill. A student's self-efficacy in a given situation depends on the perceived challenge of the assignment as well as the time provided to fulfill it. Thus, as mentioned, a benefit of the VEC is that it takes away the fear of dealing with life and death (minimizing the challenge) while keeping the responsibility of making the right decisions. This gives the student more time to think, look for guidance in the literature and make a choice in a safe environment, while gaining experience to be used when faced with a similar case in reality. Hence challenge and skill may be more balanced in this environment where the student can learn without fearing the consequences of making mistakes.

The relatively small number of students participating in this study is a limitation to take into account when drawing conclusions. The actual number of students enrolled in the course was higher (Table 1), but not all participants responded to repeated requests for them to return their completed questionnaires. The final response rate of 55-68% was accepted for data analysis, but larger studies in the field would be desirable. Additionally, we only investigated the students' perceived level of knowledge. Accordingly, this study cannot conclude on the actual level of knowledge obtained after implementing the VEC. However, as our aim was to investigate the students' own learning experience rather than to assess the VEC as a tool to improve factual knowledge, this is not considered a limitation.

Conclusion and perspectives

The learning aims of the current course are for the student to achieve knowledge of as well as skills and competences for examining, diagnosing and treating critically ill animals. While the course aims to provide a good overview of these diseases theoretically, being able to identify a specific disease in a patient requires application of the theory in practice. The VEC helps fulfill the learning aims by providing the student with ample possibility to apply the theory practically, independent of the variety and number of patients they are fortunate to see on their emergency shifts, thus filling an existing void of available emergency patients.

The results of this study demonstrate that including problem-based learning in the form of a virtual clinic in the EOCA course increases the self-efficacy of Danish veterinary students for managing emergency patients under supervision during their training and indicate a similar effect with regards to patients in their future careers. We believe that this is likely to be true for veterinary students internationally. Student evaluation of the VEC revealed how it was fundamental in helping them think through the choices one must make for a given patient, how it was helpful in exam

preparation and how it made them feel that they had not missed out on important learning situations if they happened to be on rotation on a day in which the number of emergency patients presented to the hospital was low. Thus, despite the challenges we faced when developing the simulated emergency room, and despite the obvious lack in its current form regarding feedback, it can be concluded from our study that the pedagogical outcome has been positive. This encourages us to prioritize this educational tool, add more cases and further improve the VEC so that, in the future, it will hopefully simulate the emergency room so closely that only the live animal is lacking.

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Validity assumptions for a multiple-choice test of medical knowledge with open-books and web access. A known groups comparison study

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Research article, peer-reviewed

Relatively little evidence about the validity threats in open-book multiple-choice tests exist. The aim of this study was to examine validity aspects relating to generalization, extrapolation and decision of a multiple-choice test of medical knowledge with aids (open-book and internet access). The theoretical framework was modern validity theory, and the study was designed as a 'known groups comparison' study. Test performances of three known groups of test takers hypothesized to have different knowledge levels of the test content were compared, and analysis of pass/fail decisions was used to examine implications of decisions based on test scores. Results indicated that it was possible to discriminate between expert and non-expert test taker groups even with the access to aids. In contrast, an indefensible passing score was found to be the largest potential threat to test validity.

Keywords

Open-book assessment, Education, Medical Student, Performance Assessment, Validity.

Background

Paradoxically examinees are often denied access to check factual information - even in tests of applied knowledge, suggesting that in practice many test administrators treat factual and applied knowledge as directly interchangeable. There appears to be little published evidence documenting the necessity of denying examinees free information seeking. As a consequence, we know relatively little about the validity threats arising from the access to look up information in tests of applied knowledge.

Assessment is generally recognized as an extremely important driver of students' learning in higher education, and assessing higher order thinking skills has been considered to encourage 'deep learning' (J. Biggs & Tang, 2007; J. B. Biggs & Collis, 1982; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). This has led to an interest in open-book assessments, in which students can use textbooks, notes, journals etc. as reference materials during tests. Less focus on isolated factual knowledge recall could have the benefit of lowering the time and energy students tend to spend on cramming less relevant facts and on being stressed out in overloaded curricula. It seems that open-book assessment might reduce student anxiety and stress in higher education (Gharib, Phillips, & Mathew, 2012; Theophilides & Dionysiou, 1996; Zoller & Ben-Chaim, 1989), and encourage deep learning (Baillie & Toohey, 1997; Eilertsen & Valdermo, 2000; Theophilides & Koutselini, 2000), although these conclusions have been contested (Agarwal, Karpicke, Kang, Roediger, & McDermott, 2008).

In medical education proponents of open-book assessment have argued that access to information makes clinical problem solving tests more authentic and aligned with what happens in everyday clinical practice (Broyles, Cyr, & Korsen, 2005; Feller, 1994; Frederiksen, 1984; Heijne-Penninga, Kuks, Schönrock-Adema, Snijders, & Cohen-Schotanus, 2008; Spetz, 1989), and that their use may encourage deeper clinical learning (Broyles et al., 2005; Heijne-Penninga, Kuks, Hofman, & Cohen-Schotanus, 2011; Heijne-Penninga et al., 2008), and enhance long-term retention (Heijne-Penninga, Kuks, Hofman, Muijtjens, & Cohen-Schotanus, 2013). Allowing books etc. in the exam may signal to students that memorizing all isolated facts should be less of a worry, and that the main aim of their learning should instead be the meaningful integration of knowledge. Against this backdrop of suggested benefits, validity researchers have also started to explore open-book assessment (Brightwell, Daniel, & Stewart, 2004; Krasne, Wimmers, Relan, & Drake, 2006). Nevertheless, *the literature on the validity of open-book assessments is sparse, and there is currently no evidence for exclusively using either closed-book or open-book exams* according to a recent review (Durning et al., 2016).

Validity framework

The modern theoretical framework for examining questions relating to test validity is the 'unified' validity framework (American Educational Research Association, 2014;

Kane, 2006; Messick, 1987). In this framework, all sources of validity evidence are considered as counting towards construct validity. The idea of the existence of different 'types' of validity, such as content validity, predictive validity, concurrent validity, and discriminant validity etc., has been abandoned. Instead, Kane (2006) outlined four major categories of inferences, which may be examined and challenged in validation research. These are inferences relating to: *scoring* (from observed performance to observed score), *generalization* (from observed score to 'universe score'), *extrapolation* (from the universe score to the level of skill), and *decision* (from conclusion about level of skill to decisions taken). Using Kane's (2006) approach, we propose the main inferences relating to scoring in our context to be: 1. the electronic recording of students' responses represents students' intended answers, 2. the answer key for items is appropriate, and 3. the answer key is applied accurately and consistently. The main inferences for generalization are: 4. the observations made in testing are representative of the universe of observations defining the testing procedure, and 5. the sample of observations is large enough to control for sampling error. We propose the main inferences relating to extrapolation in our context to be: 6. the test tasks require the competencies developed in the course, and we may safely extrapolate expertise levels from the test scores, and 7. there are no skill irrelevant sources of variability that would seriously bias the interpretation of scores as measures of students' subject knowledge. The main inference relating to decision in our context was perceived to be: 8. Students with no or low levels of subject knowledge are unlikely to pass the test and progress in the programme. All inferences and assumptions cannot be evaluated in one single validation study, but rather in a programme of validation research. The most relevant kinds of validity evidence to examine first are those that support the main inferences and assumptions in the interpretative argument, *particularly those main inferences which are most problematic* (Cook, Brydges, Ginsburg, & Hatala, 2015). It seemed to us, that what Cook et al. (2015) called 'the weakest assumptions in the evidentiary chain' in our context were those related to extrapolation and decision (validity assumptions 6.-8. above), because the open-books and web access were allowed in these exams. An obvious competing alternative to argument 6 was, that the test tasks did *not* require the competencies taught in the course (subject knowledge), but merely access to aids like books and the web combined with good information seeking skills. If this competing interpretation proved correct, arguments 7 and 8 would also be seriously challenged.

Aims and objectives

The overarching aim of this study was therefore to examine aspects of validity relating to generalization, extrapolation and decision for a multiple-choice examination of medical knowledge with open-book and web access. The objectives were to: 1) ex-

amine dependability of test scores, 2) compare test scores from test takers with known differences in expertise levels, and 3) examine the pass/fail decisions for test takers with known differences in expertise levels.

Methods

The context of the study

Approximately a quarter of the curriculum at Aarhus University Medical School is assessed using multiple-choice examinations of medical knowledge, which allow open-book and web access. The learning outcomes tested in these exams are in the knowledge and applied knowledge domains. For examples of multiple-choice items testing these two types of knowledge we refer readers to the item writing guidelines by Case & Swanson (2002). The exams consist of 80 One-Best-Answer multiple-choice items each with three answer choices and a test time of 1.5 minutes per item, i.e. 2 hours of test time in total. The guidelines and checklists used for item construction were based on the work of the National Board of Medical Examiners (NBME) in the USA (Case & Swanson, 2002). Each test set is checked by an external examiner for relevance and validity of content before the exam. In the exams students bring along and use any written material they find useful, and they may use personal electronic devises to look up information on the device or on the internet if needed. Communication with others during the exam is prohibited. The students record their responses on iPads supplied by the university. Six to eight invigilators, who constantly move about the room checking examinees' screens and behaviours, enforce the communication ban. Mobile phones are stored away in bags and may not be handled during the exam.

Design

The study was designed as a 'known-groups comparison' study. Although a known-groups comparison study in isolation is never sufficient to claim validity of scores (Cook et al., 2015), accurate discrimination between groups with different expertise levels is an absolute necessary prerequisite for validity. The ability to differentiate between low-ability and high-ability test takers has been described as a 'fundamental principle of all educational measurement and a basic validity principle' (Downing & Yudkowsky, 2009). The known-groups comparison design allowed us to examine to what extent the test tasks in an open book/web setting *seemed* to require the competencies developed in the course, whether hypothesized expertise levels could be extrapolated from the test scores in the open book/web setting, and whether students with *no* or *lower* level of subject knowledge were likely to pass the test and progress in the program under open book/web conditions. In other words: our primary, initial validity concern was, whether unprepared students could pass the test under the open book/web conditions. This concern influenced our choice of compar-

ison groups, and made us compare relatively equally advanced students assumed to have different subject expertise levels depending on course participation/non-participation and on educational background (medical/non-medical). If the performances of test takers with no medical background would turn out to be indistinguishable from one or both groups with a medical background, it could indicate a considerable validity threat arising from the open-book web access conditions alone.

Participants

We compared three groups of students, which we labelled as medical experts, medical non-experts, and other non-experts.

As our 'expert' group sample we chose fourth year medical students who had previously completed the course 'Inflammation' and the corresponding open-book/web examination. They were labelled 'experts' in this study, because we were particularly interested in *challenging* whether the test tasks *seemed* to require the competencies developed in the course at all (see validity assumption 7) given the open book/web conditions.

As our non-expert test takers, we invited 2 groups of university students (medical students and other university students) to complete the same exam as the expert students and under similar test conditions. These two groups completed the test in February 2015. It was a requirement that non-experts were bachelor students in their last (third) year or just about to embark on their fourth year in order to avoid comparing our experts with novice students, and to allow for generic (i.e. subject independent) information seeking skills in the three groups to be as equally developed as possible. The medical non-experts were assumed to have some level of relevant medical background knowledge although they had not yet embarked on the Inflammation course, and so they were assumed to perform less well than the course takers (expert group), but better than university students with no medical background knowledge at all (other non-experts). The latter group was assumed to rely mainly on their generic (subject independent) information seeking skills or guessing, i.e. they were assumed to rely mainly on competing test constructs. Together these three groups were assumed to cover the full spectrum of expertise. In order to allow for the worst possible outcome for the test validity to be able to take place, and thereby to seriously challenge validity assumptions 6-8 above, it was essential that students with no medical backgrounds (i.e. the 'other' non-experts) were also allowed a go at performing well on the test. All volunteering students were asked to supply their names, e-mail addresses, their programmes of study and the semester they were on. The subject to be tested was not known to non-expert participants before the test.

Procedure

The physical facilities booked for the test of non-experts were the same as used in the ordinary exam. The test time (2 hours) was the same for experts and non-experts. Before the test started the purpose of the test and study was explained to the non-expert participants, along with the test time and the number of items to be answered. They were encouraged to use the open-book and web resources as they saw fit. Before the test started the non-expert participants were instructed on how to get access to the course e-book on their devices and the search facilities within this e-book. The non-experts answered the test electronically on the same iPads as used in the original examination. After 2 hours of test time the test was stopped.

Materials

The e-course book which participants were given access to was a basic book in medicine and surgery (Schroeder, Schulze, Hilsted, & Aldershvile, 2012). The exam paper was an exact copy of that used in the examination of the course 'Inflammation' on 14 June 2013. We chose this exam paper because these test results were amongst the most internally consistent test results available, and because the majority of the items in that paper tested applied knowledge as opposed to factual knowledge (Case & Swanson, 2002). Of the 80 items in this test, 64 tested applied knowledge while 16 tested factual knowledge. Scoring was 'dichotomous', i.e. 1 point was given for each item answered correctly, and 0 points were given for incorrectly answered items. This meant that test takers could obtain total test scores of between 0-80 items correct.

Analyses

We calculated the mean score, the range of scores, and the standard deviation (SD) of the test scores for the three groups. As our item discrimination index we calculated the correlation between students' performance on the item and their performance on the entire test, also known as the point-biserial correlation coefficient (PBS) (Case & Swanson, 2002; Haladyna, 2012). The level of PBS reflects 'the degree to which an item contributes to the measurement objective of the test' (Downing & Yudkowsky, 2009). It is an item characteristic which quantifies the item's ability to measure existing differences among individual test takers sensitively (Haladyna, 2012). The PBS coefficient values may range from -1 to 1, and at minimum PBS should be a positive number (Downing & Yudkowsky, 2009). PBS coefficients yield approximately the same information when dichotomous scoring is used, as the discrimination parameter from a two or three parameter model rooted in Item Response Theory (IRT) (Haladyna, 2012). In addition, PBS calculations do not require more than 500 examinees unlike the simplest IRT alternative (a two-parameter mod-

el), and it is therefore recommended for more modest sample sizes of examinees (De Champlain, 2010).

Analysis of generalizability

As validity evidence in the category generalization, we examined the dependability coefficients (Φ) of test takers' scores for each of the three groups, with a 'person crossed with item' design based on Generalizability Theory (Brennan, 2001). The phi (Φ) coefficient is a way of quantifying the *relative* influence of error on test scores. A phi coefficient of 0.70 for example, would - with our generalizability design - indicate that 70% of the observed score variance was due to real student performance differences, while 30% of the variance in scores was caused by error either related to the sample of items used or occurring at random.

Analysis of extrapolation

The test scores of the three groups of test takers were examined for equal variances with Levene's test, which confirmed unequal variances. After a quadratic transformation of data the problem of unequal variances was resolved, and the transformed data was examined for group differences with a one-way analysis of variance (ANOVA) test. Tukey's test was used to examine the significance of differences between all possible participant group pairs.

Analysis of decisions

The phi coefficients from the generalizability analyses were subsequently used to calculate the standard error of the measurement (SEM), which is another way of quantifying measurement error - this time in the same units as the test scores. A score difference between two test takers of > 1.96 x SEM may be considered statistically significant (Harvill, 1991). We inspected box plots of the scores of the three groups of test takers, and examined for differences in scores of the best performing non-expert and the poorest performing experts by checking for overlap in their 'reasonable limits' score bands (Harvill, 1991). Secondly, we calculated the number of non-expert participants who would have passed the test with the cut-score used in the original exam, as well as the percentage of the expert examinees who had scores >1.96 x SEM above the best performing non-expert test taker (Harvill, 1991). Thirdly, because of the test conditions (open-book and web), we also checked for the consequences of the presence of the 16 factual items in the test, by examining the scores and the pass/fail decisions of the three groups on the test with the factual items removed, to determine whether their presence made a difference.

All statistical analyses were performed using the statistical package STATA/IC 14, except the Φ coefficient which was estimated with the software GENOVA for PC.

Results

Of the 79 non-experts who volunteered to participate in the test, 71 turned up to participate on the test day. Of these 71 non-expert participants, 41 were medical students and 30 were other university students. The 30 'other' non-experts' academic backgrounds were: Arabic and Islam studies (n=2), Economics (n=10), Engineering (n=1), Physics (n=1), Japanese (n=1), Molecular Medicine (n=5), Molecular Biology (n=1), Psychology (n=6), Social Sciences/Philosophy (n=1), Political Science (n=2). Of the 71 non-experts 50 were third year students and 21 were fourth year students.

Item point-biserial correlations (item discrimination measures) ranged from 0.05-0.87 with a mean of 0.62 across the full range of behaviour in all groups (n=249). Two of the 79 items had point-biserials below the recommended minimum (<0.15), but none were close to 0 (Case & Swanson, 2002).

The average item completion rates were 100% (79/79) for the expert students, 92% (73/79) for the medical non-expert students and 71% (56/79) for the other non-expert students.

Table 1 reports the overall test characteristics and results based on 79 of the original 80 items in the test. One of the 80 items had to be removed from the analysis, due to an error occurring in the test of the non-experts (table 1).

Table 1. Main test indices (n_{items}=79).

Group	n	Mean scores	Range of scores	SD	SEM	Φ
Expert, medical	178	72.70	52-78	4.14	2.28	0.70
Non-expert, medical	41	37.20	9-50	8.46	4.26	0.75
Non-expert, other	30	23.63	12-39	7.54	3.94	0.73

SD=Standard Deviation, SEM=Standard Error of Measurement, Φ=the dependability coefficient for the absolute score values.

Generalizability

The dependability coefficients for the three groups of test takers are reported in table 1.

Extrapolation (comparison of test scores)

Figure 1 visualizes the test scores of the three groups expected to be at different levels of subject expertise by means of a 'box-and-whisker' plot. In this plot type, the grey box displays the interquartile range (the 25th to 75th percentiles). The 'floor' of

the boxes indicates the lower quartile, the 'roof' of the box indicates the upper quartile, and the central line is the median. The horizontal ends of the 'whiskers' attached to the boxes display the upper and lower values of scores falling within 1.5 times the interquartile range, while values outside this range are plotted individually (dots).

Figure 1. Test scores and outliers visualized.
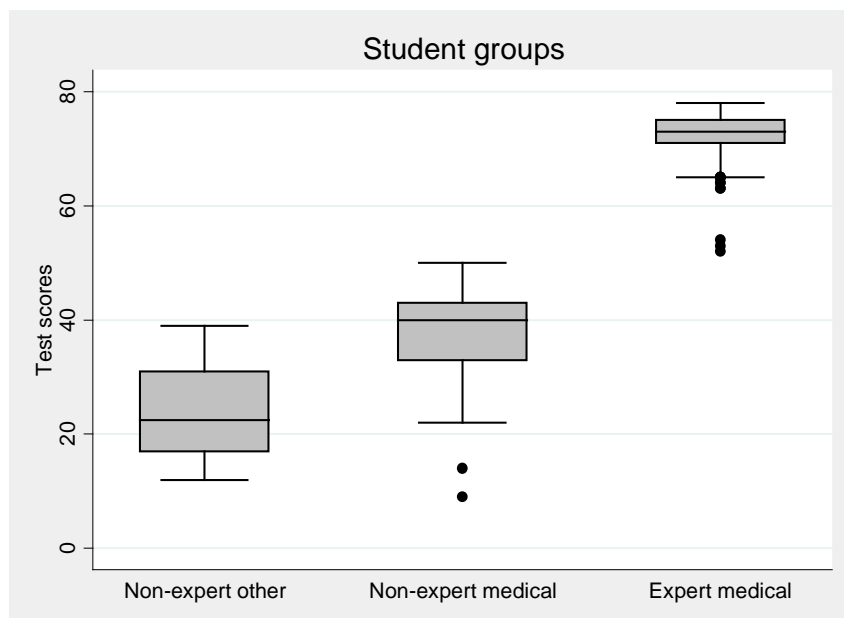
The highest scoring medical non-expert scored 50 items correct. The three lowest scoring medical experts scored 52, 53 and 54 items correct respectively, while the fourth lowest scoring expert scored 63 items correct.

The ANOVA test showed that there were significant group differences in the test scores reported in table 1 and figure 1 (F=1439.39, $df_{between\ groups}$=2, $df_{within\ groups}$=246, p<0.001), and Tukey's post hoc test confirmed the statistical significance of all inter-group differences.

Decisions

The best performing non-expert scored 50 while the three poorest performing expert students scored 52, 53 and 54 respectively (see fig. 1). The reasonable limits score bands for the best performing non-expert and the three worst performing experts overlapped indicating no differences in performance. There was no overlap in the reasonable limits score band of the third and fourth lowest scoring expert; i.e. 175 of the 178 experts (98.3%) most likely scored significantly different than the best performing non-expert, and the three lowest scoring experts could be considered outliers relative to the other experts.

When applying the existing passing cut score for the test (>50% correct) to the results, we found that 51% (19+2=21 of 41) of the medical non-experts would have passed the test, while none of the other non-experts would have passed (see table 2).

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Table 2. Test consequences by group (n_{items}=79).

n items correct	ECTS grade	Consequence	Experts (n=178)	Medical non-experts (n=41)	Other non-experts (n=30)
0-25	F	Fail	0	3	18
26-39	F_x		0	17	12
40-47	E		0	19	0
48-55	D	Pass	3	2	0
56-63	C		2	0	0
64-71	B		41	0	0
72-79	A		132	0	0

ECTS=European Credit Transfer System. The grades were assigned as follows: students with ≤32.5% correct items received the grade of F, students with >32.5% and ≤50% correct items were graded Fx, students with >50% and ≤60% correct items were graded E, students with >60% and ≤70% correct items were graded D, students with >70% and ≤80% correct items scored grade C, students with >80% and ≤90% correct items scored grade B, and students with >90% correct received grade A. The dashed line demarcates the cut score for pass/fail decisions used in the examination of the experts in June 2013.

Discounting the 16 factual items and analysing the consequences of a test containing only the 63 applied knowledge items with the same cut score (>50% correct) - we found it made no difference to the pass/fail decisions in the expert group (table 3). In contrast, two additional non-experts (one 'medical' and one 'other') would have passed the test if the 16 factual items had been discounted (see tables 2 and 3).

Table 3. Test consequences by group when the 16 factual knowledge items were removed (n_{items}=63).

n items correct	ECTS grade	Consequence	Experts (n=178)	Medical non-experts (n=41)	Other non-experts (n=30)
0-20	F	Fail	0	3	18
21-31	Fx		0	16	11
32-37	E		0	19	1
38-44	D	Pass	3	3	0
45-50	C		1	0	0
51-56	B		42	0	0
57-63	A		132	0	0

ECTS=European Credit Transfer System. The grades were assigned as follows: students with ≤32.5% correct items received the grade of F, students with >32.5% and ≤50% correct items were graded Fx, students with >50% and ≤60% correct items were graded E, students with >60% and ≤70% correct items were graded D,

students with >70% and ≤80% correct items scored grade C, students with >80% and ≤90% correct items scored grade B, and students with >90% correct received grade A. The dashed line demarcates the cut score for pass/fail decisions used in the examination of the experts in June 2013.

Discussion

Open-book/web conditions in a multiple-choice test of medical knowledge with 79 items and 1.5 minutes of test time per item did not undermine the ability to distinguish between known groups. In contrast, the arbitrarily chosen cut score could pose a threat to test validity.

Generalizability

We found dependability coefficients for the three groups in the ranges 0.70-0.75 for a 79-item test (table 1). What constitutes *sufficient reliability depends on the stakes and purposes of a test situation* (Downing, 2004). Downing (2004) suggested that very high stakes testing, such as licensure or certification examinations in medicine would require very high levels of reliability (≥0.90). End-of-course or end-of-semester type exams (like the exam situation we investigated) could probably defend levels of reliability in the ranges of 0.80-0.89. While lower stakes assessments, such as formative or summative classroom-type assessments, created and administered by local faculty (like the exam paper we investigated) might be expected to be in the range of 0.70–0.79 (Downing, 2004). The level of generalizability estimated in this study (table 1) was perhaps somewhat lower than would typically be required for the stakes of the test situation in which they were used in practice. Too few items in the test, low item discrimination (PBS) and the access to look up information may all affect test reliability negatively. Test reliability reflects the extent to which a test can differentiate or tell apart test takers' performances (Streiner & Norman, 2003). *For the purposes of this study*, however, the levels of reliability were sufficiently high to allow significant and meaningful discrimination of known groups of test takers (figure 1).

Extrapolation (comparison of test scores)

The significant group differences in test scores is evidence in support of validity assumption 6 outlined above: course participants ('experts') were more competent in solving test tasks than the non-participants (non-expert groups), and the expertise levels could also be extrapolated as expected, i.e. experts outperformed medical non-experts who in turn outperformed other non-experts. We found that information seeking was not a sufficiently influential cause of Construct Irrelevant Variance (CIV) or 'noise' (Downing & Haladyna, 2004), to make the assessment results uninterpretable in this open book/web multiple-choice test, meaning that validity assumption 7 could not be rejected. Others have previously reported examinees' test scores in open-book tests to be the same as their scores in closed book tests

(Kalish, 1958; Krarup, Naeraa, & Olsen, 1974), or significantly lower although student ranking was almost the same (Heijne-Penninga et al., 2008).

Decisions

As internationally recognized standard setting procedures apparently are at odds with Danish laws on examinations, and because test administrators of the original exam were obliged to choose a cut score before exams, an arbitrarily chosen pass score of >50% correct was imposed in the exam context. This arbitrarily chosen cut score appeared to be a greater potential threat to test validity, as such a sizable proportion (51%) of medical non-experts who had not embarked on the Inflammation course were able to pass the test with the cut score in operation (table 2). However, in practice only three of the 178 medical expert students (1.7%) who passed the original exam in June 2013 appeared to be no more competent, than a medical student who had never taken the course. Some of the best medical non-experts might well have had an excellent pre-existing knowledge base in physiology etc., which may have made it possible for them to deduce some answers, even though they had not taken the Inflammation course yet. A higher cut score could have secured the failure of all our non-experts as well as the outliers observed in the expert group (see fig. 1). Recognized *standard setting methods* (such as Angoff's, Ebel's, Hofstee's, borderline, or contrasting groups methods etc.) are generally recommended for the purpose of trying to reach the most defensible cut scores possible (Downing & Yudkowsky, 2009). However, challenging any cut score in operation (whichever way it was decided) with a reality check - as we did with this study - is recommended in all test settings (Downing & Haladyna, 2004; Livingston & Zieky, 1982), as indefensible cut scores may end up undermining test validity (Downing & Haladyna, 2004). The evidence in relation to validity assumption 8 indicated that test takers with *no* expertise level (other non-experts) were unlikely to pass the test, whereas test takers with *lower* expertise levels (medical non-experts) were relative likely to pass the test, although in reality it appeared to be a relatively rare occurrence (the expert outliers).

Interestingly, the presence of factual items did not seem to make it easier for the non-experts to pass the test (tables 2 and 3). One explanation of this result could be that they tended to be extensive information seekers irrespective of whether a factual or applied knowledge item was encountered. However, it could also be a coincidental finding.

In summary: we found an indefensible pass score, and *not* the 'off-target' or 'non-primary' construct of information seeking to be the largest threat to the test.

Limitations

Some limitations to the interpretation of results need to be mentioned. Firstly, we cannot rule out that group differences in test scores could have been even larger

under closed-book test conditions, i.e. we cannot rule out some negative effects on test validity because of the open book/web conditions. However, our immediate concern was whether or not information seeking was sufficiently influential to make assessment results uninterpretable.

Despite the high completion rates of our non-experts, the expert group's desire to do well in the test may well have been larger than that of our non-expert volunteers, which may have counted towards the group differences in scores observed.

We assumed that generic information seeking skills (e.g. using the search function in the electronic textbook and in google etc.) would be relatively equally developed in the three groups we compared, as all participants had around three years of university experience. However, we cannot be sure. If these generic or subject independent information-seeking skills were very different in the three groups, it may have biased results. Also, we cannot prove that our samples of non-experts were representative of their respective background populations on other important variables (e.g. intelligence, general academic skills), which may restrict the external validity of the results. However, voluntary participants generally tend to be more intelligent and better performing as students than non-volunteers (Callahan, Hojat, & Gonnella, 2007; Rosenthal & Rosnow, 2009), so it is more likely that our non-experts may have represented relatively capable challengers of the test validity.

Finally, it is still wise to adapt a cautious attitude, as it is also clear from the literature, that we need more studies from different contexts examining the threats to validity in open-book tests of medical knowledge before we can be more certain of any general tendencies (Durning et al., 2016). The next natural step in a validation programme would be to challenge whether test scores obtained under open-book/web condition also predict post-graduate performance.

Conclusion

No other previously published study of open-book/web assessment challenged validity assumptions in operation by examining the test performance of known non-experts. We found that free access to look up information did not undermine test validity to such an extent, that it was impossible to discriminate between known groups' hypothesized performances in a 79-item open book/web test of medical knowledge with 1.5 minutes of testing time per item. In contrast, an indefensible pass score was found to be the largest potential threat to test validity. Being allowed to use a recognized standard setting method, which takes into account the free access to information seems to be a more defensible approach for the future. These results add original and relevant knowledge to the limited existing body of studies examining the validity of open-book tests in medical education (Durning et al., 2016).

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Studiemiljø og frafald på videregående uddannelser: Betydningen af undervisning, faglig identifikation og social integration

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Videnskabelig artikel, fagfællebedømt

I årtier har frafald på videregående uddannelser været et centralt forskningsområde. Imidlertid er viden om studiemiljøets - dvs. institutionelle aspekters - betydning for frafald relativt begrænset. Informeret af Tintos institutional-departuremodel skelner artiklen mellem faktorer relateret til tre kategorier: det sociale system, det faglige system og undervisning. Disse kategorier specificeres med reference til tidligere internationale og nationale studier. Artiklen foreslår en revideret teoretisk model for forståelse af frafaldsprocesser, der ikke udelukkende ser på studiemiljøet som den traditionelt dikotomiske tænkning mellem det sociale og det faglige system, men som også inkluderer undervisning som en overlappende kategori med både det sociale og det faglige system.

Introduktion

Siden etableringen af formelle uddannelser har studerendes frafald været et fokusområde for forskning (Aljohani, 2016), og forsøget på at minimere frafald er også i dag et aktuelt indsatsområde (European Union, 2015). Intentionen om at mindske frafald kan motiveres i mange forhold: Frafald kan være forbundet med nederlag for den enkelte, finansielle tab for uddannelsesinstitutionen, og det kan udfordre målsætninger på samfundsniveau (Mountford-zimdars & Sabbagh, 2013; DeAngelo & Franke, 2016: 1589; Trow, 2005: 15; Carnevale, Strohl & Smith, 2009: 21).

I denne artikel stilles der skarpt på studiemiljøets - dvs. de institutionelle aspekters - betydning for frafald, da netop faktorer relateret hertil er underbelyste (Tinto, 2007). Vha. Tintos longitudinale *institutional departure model* (Tinto, 1975, 1993), der analytisk skelner mellem studerendes individuelle baggrundsvariable og studerendes integration i uddannelsesinstitutionens henholdsvis sociale og faglige system, udpeges der i artiklen en række faktorer med betydning for frafald, der relaterer sig til institu-

tionelle aspekter. Tintos model differentierer således mellem ikke-institutionelle faktorer, som fx den studerendes køn, alder og sociale baggrund, og faktorer, som refererer til det institutionelle, idet disse relateres til integration i henholdsvis et fagligt og socialt system (Tinto, 1975). Modellen indeholder ikke en nærmere bestemmelse af, hvilke faktorer i de to systemer der har betydning for individets integration. Flere empiriske studier har dog beskæftiget sig med forskellige institutionelle faktorer, der har vist sig at have betydning for frafald. I denne artikel sættes der fokus på at identificere faktorer relateret til institutionelle aspekter fra nationale og internationale studier, der beskæftiger sig med forholdet mellem frafald og faktorer på uddannelsesinstitutionen. Det anerkendes selvfølgelig, at ingen indsatser på institutionsniveau vil kunne kompensere fuldstændigt for betydningen af individuelle baggrundsfaktorer (Hardy & Aruguete, 2014, s. 560). Ikke desto mindre sætter artiklen fokus på de faktorer, der relaterer til institutionelle aspekter. Det sker af to grunde: Dels er disse faktorer i mindre grad teoretisk uddybet, og dels er der tale om faktorer, som institutionen kan påvirke for at gøre en indsats mod frafald (Tinto, 2012, s. 4). Faktorerne forstås og analyseres vha. begreber fra 'The institutional departure model' med henblik på at videreudvikle den teoretiske forståelse af institutionens betydning for frafald. Dette gøres ud fra forskningsspørgsmålene:

1. Hvilke faktorer relateret til studiemiljøet, analytisk differentieret som det sociale system, det faglige system og undervisningen, har betydning for frafald på videregående uddannelser?

2. Hvilken viden om disse faktorer findes i tidligere nationale og internationale studier af frafald?

3. Hvordan kan denne viden bidrage til at udvikle forståelsen og illustrationen af faktorernes relation til hinanden, som den er fremstillet i Tintos institutional departure model?

The institutional departure model

Valget af 'The institutional departure model' som analytisk ramme er begrundet i, at den er foreslået at ligge til grund for et paradigme inden for frafaldsforskning (Braxton & Hirschy, 2004, s. 89). Denne artikel anvender udgaven af modellen fra bogen *Leaving college* (Tinto, 1993) samt en revideret udgave, der inddrager undervisning og læring (Tinto, 1997). Modellen er oversat til dansk af Ulriksen, Madsen & Holmegaard (2011), men for at undgå begrebsforvirring ift. de internationalt identificerede studier anvendes de engelske udgaver (se figur 1 og 2). I modellen fra 1993 (se figur 1) skelnes der overordnet mellem institutionelle faktorer, der er relateret til et socialt og et fagligt system, idet disse differentieres fra studerendes baggrundsfaktorer og fællesskaber uden for uddannelsesinstitutionen (Tinto, 1975, s. 95).
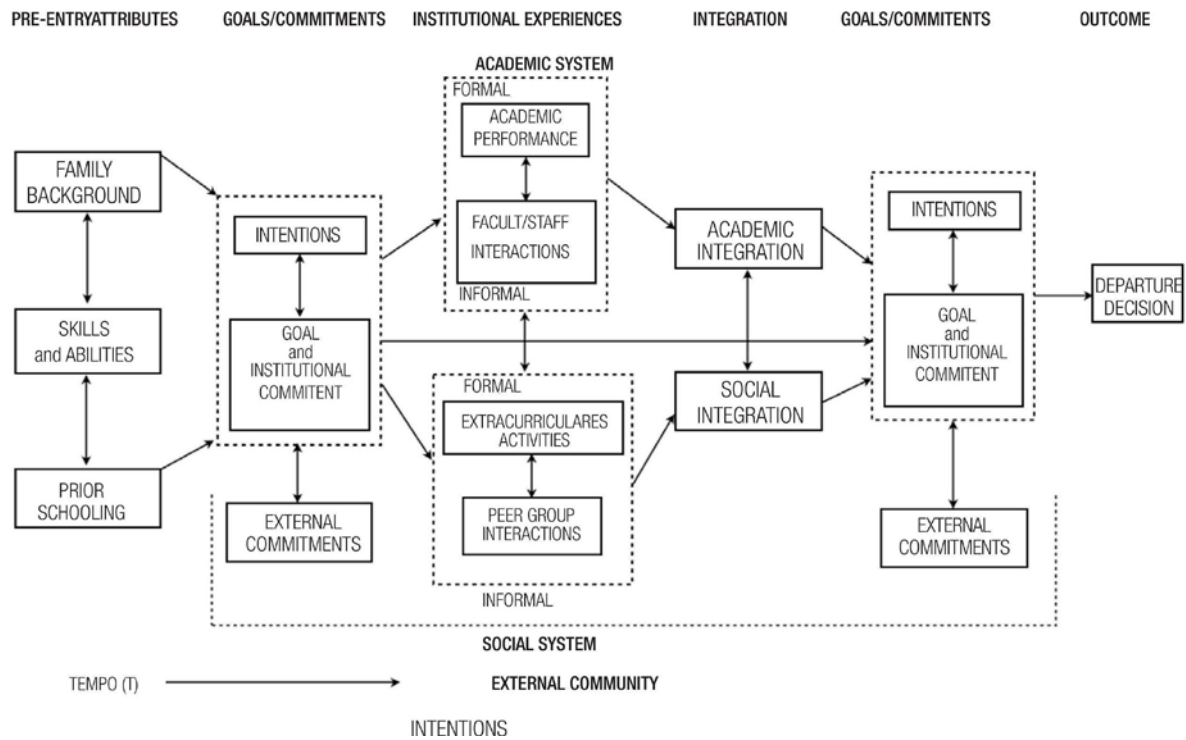
Figur 1: Tintos 'The institutional departure model' (Aljohani, 2016 efter; Tinto, 1975, 1993)

'The institutional departure model' er en sociologisk inspireret model. I et studie af udbredte teoretiske modeller for frafald på videregående uddannelser foreslår Aljohani (2016), at Tintos sociologisk orienterede model kan forstås som et modsvar til tidligere modellers orientering mod sammenhænge mellem individuelle egenskaber og frafald med afsæt i en psykologisk tradition (Aljohani, 2016). Tintos orientering var inspireret af sociologen Spady (1970), som introducerede en analogi mellem frafald og Durkheims (1978) teori om selvmord. I Spadys model bliver et frivilligt frafald at forstå som manglende integration i det over-individuelle system svarende til Durkheims begreb om det egoistiske selvmord (Durkheim, 1978, s. 65). I forlængelse heraf foreslår Tinto med 'The institutional departure model', at der i et longitudinelt perspektiv er en sammenhæng mellem den studerendes integration i institutionen, forstået som graden af kongruens mellem individets og systemets normer og værdier, og frafald. Her forstås integration som et resultat af mødet mellem individet og institutionen forstået som henholdsvis det sociale system, opdelt i ekstracurriculære aktiviteter og interaktioner med medstuderende, og det faglige system, opdelt i interaktion med fakultetspersonale og faglige præstationer. Analogt til det egoistiske selvmord som konsekvens af manglende integration i det oversociale påvirkes individets frafald af den oplevede integration i de to systemer. Begrebet *departure decision* indikerer sammen med de medierende variable *intentions* og *goal commitment*, at 'The institutional departure model' efterlader rum til studerendes individualitet i beslutningen om frafald.

'The institutional departure model' er hyppigt citeret og grundigt efterprøvet (Braxton & Hirschy, 2004, s. 89). En gennemgang af empiriske studier, der er baseret på modellen, resulterede dog i, at modellen kun blev vurderet delvist at være empirisk understøttet (Braxton, Sullivan, & Johnson, 1997). Mens social integration viste sig at være afgørende for frafald, syntes begrebet om faglig integration at være problematisk: Flere studier finder ingen sammenhæng mellem faglig integration og frafald (Braxton & Hirschy, 2004, s. 91), og begrebet faglig integration blev således kritiseret for at være teoretisk upræcist (Kuh & Love, 2000, s. 197). I dansk kontekst ser det dog ud til at forholde sig omvendt. Troelsen og Laursen (2014) viser gennem en sammenligning af dansk og europæisk forskning, at de studerendes forhold til det faglige er mere afgørende for frafald end deres sociale integration, hvorfor begrebet om faglig integration ikke uden videre kan afskrives i en dansk kontekst. Integration skal forstås både socialt og fagligt. Tinto beskriver, hvordan klasseværelset er en vigtig arena for denne integration, men det handler også om den faglige integration, der sker gennem interaktion med undervisere (Ulriksen, Madsen & Holmegaard, 2010, s. 213). Ulriksen, Holmegaard og Madsen (2014, s. 170) specificerer det til at handle om forskellige kulturer, der alle har betydning for studerendes integration på uddannelsen. De fokuserer på studerendes narrativer, som de ser som indlejrede i en variation af kulturer, der alle findes på uddannelsen: "We perceive the social and academic integration suggested by Tinto as students' strategies for gaining a sense of belonging. By combining Tinto's model with a socio cultural identity perspective we develop a concept to approach and understand students' negotiations of their identities." (Holmegaard, Madsen & Ulriksen, 2014, s. 172). Holmegaard, Ulriksen og Madsen taler således om faglig identifikation fremfor integration. Troelsen og Laursen (2014, s. 484) udpeger den studerendes intrinsiske værdisætning af det faglige som vigtig, dvs. at faget forstås som havende værdi i sig selv, og ikke kun i kraft af hvad det kan føre til af fx jobmuligheder. Og netop begrebet om identifikation, som vi bl.a. kender fra teorier om domæne-identifikation (James, 1968; Osborne & Jones, 2011), kan indfange dette. Dette uddybes senere i artiklens analyse af det faglige system og i diskussionen. Tintos distinktioner mellem institutionelle faktorer, der henholdsvis er og ikke er relateret til det sociale og faglige system, udgør derfor et relevant analytisk udgangspunkt for at forstå de faktorer i institutionen, der har betydning for frafald. I dansk kontekst er studiemiljø et ofte anvendt begreb i undersøgelser af den studerendes møde med institutionen (Herrmann, Jensen, & Lassesen, 2012). Studiemiljøet kan siges at være et overordnet begreb, der både indfanger uddannelsesinstitutioners sociale og faglige system ved at forholde sig til såvel studerendes relationer til medstuderende og undervisere som relationen til faget ud fra oplevelsen af arbejdsbyrde og mål for præstationer (Herrmann m.fl., 2012, s. 2). Derudover indbefatter studiemiljø, i definitionen givet af Herrmann m.fl. (2012, s. 2) en vigtig, men ofte overset faktor i studier af frafald; nemlig undervisning. Tinto har selv fremført denne kritik af frafaldsforskning (Tinto, 1997, 2000) ved at udpege un-

dervisningssituationen som en central, men overset faktor i forhold til at øge studerendes sociale og faglige engagement. Denne kritik udmønter Tinto i et forslag til en revideret udgave af sin model (se figur 2).
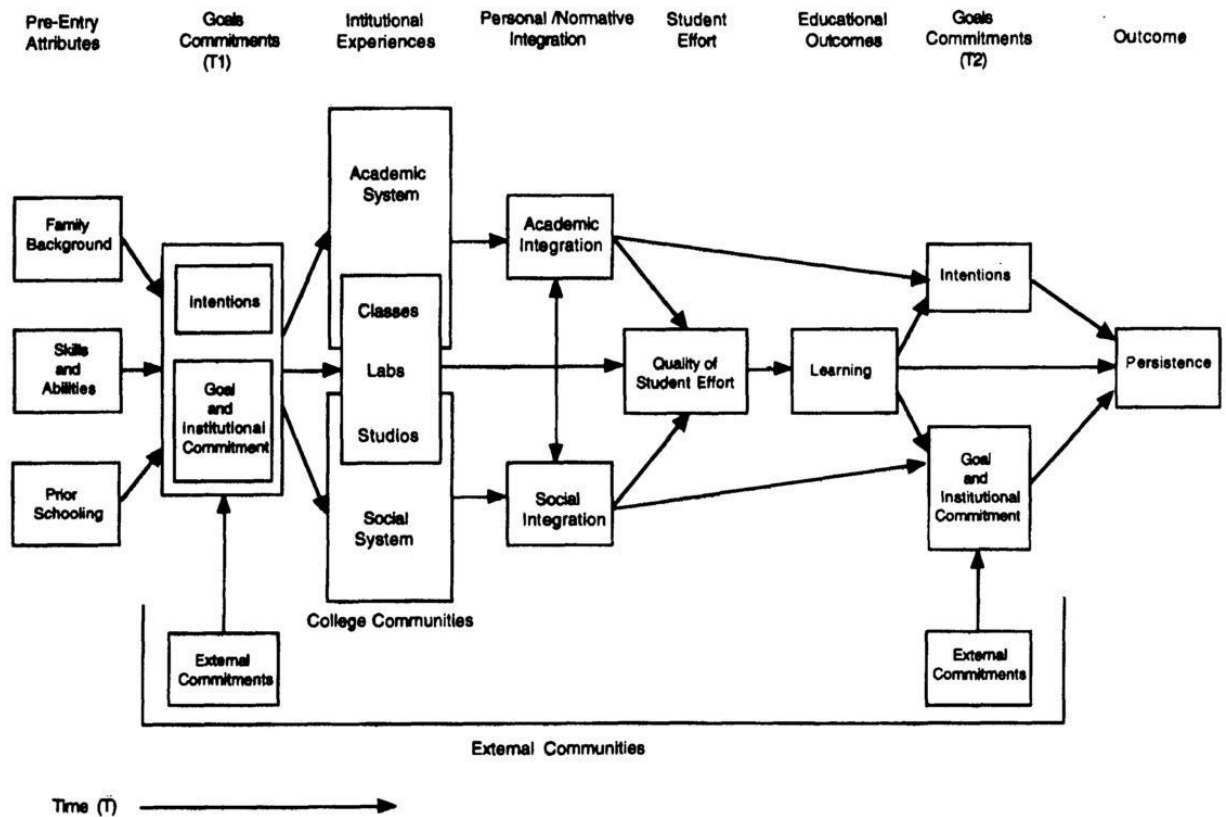
Figur 2: Tintos 'Model linking classrooms, learning and persistence' (Tinto, 1997, s. 615)

Her er tre eksempler på forskellige måder at organisere undervisning på (classes, labs, studios) taget med som en del af både det sociale og faglige system. Udover at have betydning for studerendes integration i eller identifikation med de to systemer så antages undervisning også at påvirke den studerendes indsats og læring og et evt. frafald direkte. Her benævnes udfaldet som *persistence*, hvor der i figur 1 tales om *departure.* Både frafaldsbeslutning og vedholdenhed bruges dermed til at beskrive udfaldet i modellen. Her forstås vedholdenhed som en beslutning om at fortsætte på studiet og dermed det modsatte af frafald. Som beskrevet giver 'The institutional departure model' altså anledning til at undersøge forholdet mellem institutionelle faktorer og frafald ud fra tre kategorier: det faglige system, det sociale system og undervisning - og studiemiljø kan forstås som et paraply-begreb, der dækker alle tre.

Metode

Med afsæt i Tintos institutional departure model skelner artiklen mellem tre analytiske kategorier inden for studiemiljøet - det sociale system, det faglige system og undervisningen - som undersøges ud fra et litteraturstudie af nye internationale artik-

ler af frafald i videregående uddannelser suppleret med danske artikler, reviews og hyppigt refererede artikler. Forskningsspørgsmål 1 bliver besvaret ved på baggrund af den identificerede litteratur at beskrive og specificere de tre analytiske kategorier. Specificeringen indebar en udfoldelse af hver kategori gennem eksempler fra den gennemgåede litteratur. Forskningsspørgsmål 2 systematiserer faktorerne i hver af de tre kategorier (jf. tabel 1) og opsummerer teoretisk og empirisk viden om disse (jf. tabel 2, 3 og 4). Forskningsspørgsmål 3 besvares gennem en diskussion og syntese af resultaterne fra forskningsspørgsmål 1 og 2 og udmøntes i et forslag til en revision af Tintos model.

Dataindsamling

Artiklens litteraturstudie er baseret på en søgning i databasen ERIC ([Education Resources Information Center](#)) vha. søgestrengen 'dropout'. Søgningen blev afgrænset til peer-reviewede studier inden for områdets videregående uddannelser (på engelsk 'higher education') fra året 2013 og frem. Søgeordet 'dropout' blev valgt som alternativ til fx 'institutional departure', 'attrition', 'retention' eller 'persistence', som er begreber, der anvendes inden for forskellige forskningstraditioner (Hovdhaygen, 2009). En screening viste, at 'dropout' var bredere end de øvrige termer. Bredden i 'dropout' som søgeterm understøttes også af de mange søgninger foretaget i Larsen, m.fl. (2013), ligesom også Holmegaard argumenterer for, at det er den almindeligt anvendte term, når det handler om at afslutte studiet før tid: "The term 'drop out' is commonly used to describe those students leaving their study before they pass the final examination" (Holmegaard, 2013, p. 125). Afgrænsningen til studier efter 2013 er valgt for at indskrænke søgningen. For ikke at risikere tab af centrale resultater fra tidligere blev hyppigt refererede artikler fra tidligere end 2013 medtaget. Søgningen resulterede i 296 hits, som alle blev screenet for relevans ved gennemlæsning af abstracts. 75 studier blev vurderet som relevante. Desuden er der medtaget en række review-studier (Harvey, Drew, & Smith, 2006; M.S. Larsen m.fl., 2013; Mayhew m.fl., 2016; Pascarella & Terenzini, 2005; Troelsen, 2011) for at sikre en bredde i identifikation af institutionelle faktorer relateret til det sociale system, det faglige system og undervisning med betydning for frafald. Herunder er der med udgangspunkt i Troelsens (2011) gennemgang af danske frafaldsundersøgelser lagt særlig vægt på yderligere at inkludere dansk litteratur (reviews og hyppigt refererede artikler) – både peer-reviewede artikler (fx O'Neill, Christensen, Vonsild, & Wallstedt, 2014), rapporter fra konsulent-huse (fx DMA Research, 2002), statslige organisationer (fx EVA, 2017) samt institutionel 'grå litteratur' (fx E. Smith, Reimer, & Kjeldsen, 2017). Relationen mellem den indledende screening og de øvrige søgninger (reviews samt danske undersøgelser og evalueringer) er den, at den indledende screening blev brugt til at lave den analytiske ramme, som siden nuanceredes. Endelig er der inddraget litteratur om 'The institutional departure model', det vil sige både de primære artikler, der beskriver modellen (Tinto, 1975, 1993, 1997), og litteratur, der vurderer, efterprøver

og kritiserer modellen (Berger & Braxton, 1998; Braxton & Hirschy, 2004; Braxton m.fl., 1997; Kuh & Love, 2000; McQueen, 2009; Yorke & Longden, 2004), herunder inkluderes relevante referencer fra disse studier.

Analysestrategi

Litteraturstudiet tager afsæt i en fænomenologisk tilgang. Den fænomenologiske tilgang foreskriver en toleddet proces, hvor det undersøgte fænomen først specificeres og derefter undersøges åbent (Randolph, 2009, s. 10). I dette tilfælde specificerede vi det undersøgte fænomen - frafald på videregående uddannelser - i de tre analytiske kategorier socialt system, fagligt system og undervisning, som herefter blev undersøgt åbent. Til denne undersøgelse blev der indsamlet data i form af videnskabelige artikler relateret til det undersøgte fænomen, som blev analyseret ud fra de tre kategorier med en identificering af centrale teoretiske og empiriske udsagn. Disse udsagn ligger så til grund for en grundig beskrivelse af det undersøgte fænomen. Hvorvidt udsagn i den gennemgåede litteratur er centrale vurderes ud fra forskningsspørgsmålene - det vil sige, om de relaterer sig til forholdet mellem institutionelle faktorer knyttet til det sociale system, det faglige system og/eller undervisning og frafald (Randolph, 2009, s. 11). I praksis blev analysen foretaget med afsæt i de tre analytiske kategorier (det sociale system, det faglige system og undervisningen) ved, at vi gennemlæste al den identificerede relevante litteratur. Hvert studie blev i en indledende analyse placeret som tilhørende en eller flere af de tre analysekategorier. Efter denne indledende grov-analyse gennemgik vi hver analysekategori for sig og forsøgte at underinddele fund fra studierne i faktorer. Denne fin-analyse var resultatet af en induktiv proces, hvor genlæsningen af hvert studie blev tilskrevet en faktor ('kode') afhængigt af, hvad studiet beskrev som havende indflydelse på studerendes frafald. I takt med at flere studier blev genlæst og kodet, trådte flere og flere faktorer frem, indtil alle fund fra de identificerede studier kunne kategoriseres som tilhørende mindst én, evt. flere, faktorer (identificeringen af overlap begrunder forskningsspørgsmål 3).

Kodningen var en iterativ proces, hvor tredjeforfatter lavede den første faktorinddeling, og førsteforfatteren efterfølgende justerede faktorerne, og forfattergruppen endelig diskuterede og validerede dem. Resultatet af denne analyse er tydeligt afhængig af den litteratur, studiet har fundet og arbejdet med. Vi anerkender, at et litteraturstudie foretaget med andre søgetermer og tidsintervaller ville kunne lede til identifikationen af flere/andre faktorer.

Resultater

Gennem litteraturstudiet er der på tværs af den gennemgåede litteratur identificeret en række faktorer med relation til de tre kategorier: det sociale system, det faglige system og undervisningen. Litteraturstudiet peger på otte faktorer, som relaterer sig

til og dermed kan være med til at specificere den analytiske kategori *Det sociale system*, otte faktorer, der specificerer *Det faglige system,* og 13 faktorer, der relaterer sig til den analytiske kategori *Undervisning* (jf. tabel 1.).

Socialt system (se tabel 2) f.eks.	Fagligt system (se tabel 3) f.eks.	Undervisningen (se tabel 4) f.eks.
Social integration	Faglig integration og identifikation	Oplevelse af undervisningskvalitet
Ekstracurriculære aktiviteter	Oplevelse af arbejdsfællesskab	Læsegrupper/studiegrupper
Institutionel integritet	Relation til, interaktion med og støtte fra undervisere	Alignment i undervisningen
Social infrastruktur	Arbejdsbyrde	Tydelighed
Sociale aspekter af studiestarten	Karaktergennemsnit og læring	Feedback
Studenterdemografi (alders- og kønssammensætning)	Tidligere resultater, oplevelser af og skuffelser ved eksamen	Aktiv læring - involverende undervisning med diskussioner og gruppearbejde
Studenterdemografi (etnicitet)	Studiestart	Højere ordens tænkning (higher order thinking)
Institutionens størrelse	Støtte og vejledning	Cooperative learning
		Studietekniske og introducerende kurser
		Studenterforskningsprogrammer
		Oplevelse af sværhedsgrad
		Sammenhæng mellem fag på uddannelsen
		Deltagelse i undervisningen

Tabel 1. Faktorer relateret til de tre analysekategorier (ikke rangordnede)

I det efterfølgende præsenterer vi i tre tabeller, en for hver af de tre analysekategorier, faktorerne, som de træder frem i de i undersøgelsen identificerede studier. Der forekommer henvisninger til litteraturen på tværs af de analytiske kategorier, da flere af bidragene beskæftiger sig med flere af de faktorer, som vi har identificeret. Efter præsentationen beskriver vi de forskellige faktorer, som de træder frem i de i litteraturstudiet identificerede bidrag. Under beskrivelsen skelner vi mellem 1) teoretiske definitioner og referencer og 2) empiriske undersøgelser og resultater. Førstnævnte omfatter de teoretiske forståelser af faktorerne præsenteret i de gennemgåede studier og eventuelle direkte teoretiske relationer til 'The institutional departure model', mens sidstnævnte dækker over empiriske resultater for betydningen af den givne faktor for frafald. Vi har valgt denne opdeling for at tydeliggøre, hvordan litteraturen inden for området tager forskellige teoretiske udgangspunkter, som de empiriske undersøgelser og konklusioner må forstås i lyset af, ligesom de teoretiske udviklinger er informeret af empiriske undersøgelser og konklusioner. Der er altså tale om en analytisk opdeling, da teorien ofte vil være informeret af empirien og om-

vendt. Flere af de identificerede faktorer har ikke tydeligt teoribaserede definitioner, særligt de, der kommer fra rapporter og evalueringer. Her bruges mere pragmatiske definitioner.

Socialt system

Den sociale integrations betydning for frafald er den del af 'The institutional departure model', der er stærkest understøttet empirisk i den internationale litteratur (Braxton & Hirschy, 2004). Imidlertid ser vi en mindre grad af repræsentation, når vi indsnævrer det sociale system til at omhandle uddannelsesinstitutionen. Samtidig er det sådan, at social integration ser ud til at have mindre betydning for frafaldsprocesser i dansk kontekst (U. Larsen, 2000, s. 85; Troelsen & Laursen, 2014), hvilket tilskrives en særligt udtalt individualistisk kultur (Hofstede, 1984; Troelsen & Laursen, 2014). Dette betyder ikke, at betydningen af det sociale kan afskrives fuldstændigt i en dansk kontekst, hvilket blandt andet viser sig gennem dets betydning for den faglige integration og identifikation. Således angiver fx ca. 15 % af frafaldne studerende fra Arts og Science and Technology på Aarhus Universitet, at de manglede støtte og feedback fra deres medstuderende (Aarhus Universitet, 2016a, 2016b). Med henvisning til figur 2 må mange faktorer relateret til undervisning og det faglige system også forventes at overlappe til det sociale system, da mange læringsaktiviteter understøtter de studerendes sociale involvering såfremt de foregår med medstuderende (Tinto, 1997, s. 615).

Tabel 2. Studiemiljø – socialt system

Fænomen	Teori	Empiri
Social integration	Social integration beskrives af Tinto (1975, s. 107) som graden af kongruens mellem den studerende og det sociale miljø i institutionen. Operationaliseringen af social integration varierer betydeligt fra, hvorvidt den studerende bor på campus, til mere udførlige skalaer, der måler den studerendes forhold til det sociale miljø (M. S. Larsen m.fl., 2013, s. 118). En kritik af gængse operationaliseringer og teoretiske forståelser af social integration er, at det affektive aspekt er fraværende, hvilket er problematisk, da det netop er de studerendes oplevelse af at være socialt integreret, der er central (McQueen, 2009, s. 76).	Internationalt har betydningen af social integration for frafald stærk empirisk opbakning (Braxton & Hirschy, 2004). I dansk kontekst synes social integration i mindre grad at have betydning for frafald (U. Larsen, 2000, s. 85; Troelsen & Laursen, 2014). Omvendt synes social integration dog at have stor betydning for trivsel (Herrmann m.fl., 2012).

Ekstracurriculære aktiviteter	Aktiviteter med tilknytning til institutionen udover undervisningen. Det kan være både faglige og sociale aktiviteter (Trowler, 2010, s. 18). Tinto (1993) angiver ekstracurriculære aktiviteter som en formel del af det sociale system.	Cotton, Nash og Kneale (2017, s. 73) finder, at engagement i ekstra-curriculære aktiviteter styrker den sociale integration, fordi det er en mulighed for at interagere med medstuderende. Ishitani (2016, s. 25) definerer social integration som et spørgsmål om deltagelse i ekstracurriculære aktiviteter og finder en positiv sammenhæng med vedholdenhed, gældende de første tre år af studiet.
Institutionel integritet	Overensstemmelse mellem institutionens erklærede mål og de enkelte ansattes handlinger er med til at skabe grundlag for, at studerende vil føle sig trygge og dermed interagere mere (Braxton & Hirschy, 2004, s. 99).	Baseret på en gennemgang af empiriske valideringer af 'The institutional departure model' fremsætter Braxton og Hirschy (2004, s. 99) en teoretisk hypotese om, at en institutions integritet har en positiv påvirkning på social integration.
Social infrastruktur	I relation til social integration er den sociale infrastruktur på studiet. Dette kan operationaliseres igennem spørgsmål til sociale arrangementer og muligheder for kontakt til medstuderende (Herrmann m.fl., 2012, s. 6).	Den sociale infrastruktur er forbundet med større trivsel, men denne sammenhæng mindskes, når der også kontrolleres for social integration (Herrmann m.fl., 2012, s. 7) – hvilket kan indikere, at effekten af social infrastruktur på trivsel medieres af social integration.
Sociale aspekter af studiestarten	Studiestart eller introforløb består i dansk kontekst ofte af en eller flere dage med en kombination af faglige og sociale aktiviteter, hvor de studerende gør sig deres første erfaringer med det faglige og sociale system (EVA, 2017). De sociale aspekter referer til muligheder for at lære medstuderende at kende, og sociale aktiviteter der skaber sammenhold (EVA, 2017).	Harvey m.fl. (2006, s. 17) konkluderer, at der er generel empirisk opbakning til at have en overordnet introduktion på omkring en uges længde. Tilsvarende finder Danmarks Evalueringsinstitut negative sammenhænge med frafald, når studiestarten forlænges med en dag. Derudover korrelerer de studerendes opfattelse af det sociale aspekt af studiestarten negativt med frafald (EVA, 2017).
Studenterdemografi (alders- og køns-sammensætning)	Mens mange studier kontrollerer deres resultater for betydningen af alder og køn på individniveau, har graden af diversitet i køn og alder også betydning.	Lynch og Bishop-Clark (1998) konkluderer, at større alders-diversitet kan have positiv betydning for ældre studerende. Tilsvarende kan kønssammensætningen have betydning for frafald. Kvinder kan således have større risiko for frafald på kurser med en større andel af kvinder, mens mænd har lavere risiko på de samme kurser (M.S. Larsen m.fl., 2013, s. 131).

Studenterdemografi (etnicitet)	Den etniske diversitet.	Studier har fundet, at afroamerikanere har højere gennemførelsesprocent på primært sorte institutioner sammenlignet med primært hvide institutioner (Pascarella & Terenzini, 2005, s. 393).
Institutionens størrelse	Antallet af studerende på en institution.	Forskningen i institutionsstørrelsens betydning for frafald viser blandede resultater, men peger på, at større institutioner har mindre socialt integrerede studerende (Pascarella & Terenzini, 2005, s. 386). Størrelsen af institutionen kan have indflydelse på det sociale miljø, hvor mindre institutioner kan give bedre muligheder for tætte relationer (Aypay, Çekiç, & Boyaci, 2013, s. 108).

Fagligt system

De fænomener, der relaterer sig til det faglige system, har et vist overlap til både det sociale system (fx arbejdsfællesskab) og undervisningen (fx arbejdsbyrde). Overordnet antages fænomenerne beskrevet i tabel 3 at have betydning for den faglige integration og identifikation, omend de, som tidligere angivet, også antages at have betydning for social integration, da de ofte involverer interaktion mellem flere studerende. I internationale sammenhænge, hvor studerende ofte indgår i mange forskellige fag uden faste grupper af medstuderende, har forskning i *læringsfællesskaber* (på engelsk learning communities - se Pascarella & Terenzini, 2005, s. 422), vist, at det, at en gruppe studerende tager fag sammen og indgår i et fast fællesskab, har positive effekter på deres vedholdenhed. Ideen om læringsfællesskaber kan virke mindre relevant i en dansk kontekst, hvor man på universitetsuddannelserne ofte har fast holdinddeling med mange fælles obligatoriske fag. Ikke desto mindre har disse resultater teoretiske implikationer for betydningen af faglige fællesskaber ift. både den sociale og faglige integration og identifikation samt fakultetspersonalets centrale rolle i enhver institutionelt baseret indsats mod frafald (Tinto, 2007, s. 5). Resultaterne for læringsfællesskaber understreger i den forbindelse, hvordan indretningen af det faglige system har stor betydning for de studerendes muligheder for at indgå i sociale og faglige fællesskaber med både medstuderende og fakultetspersonale. Samtidig indikerer de, at undervisere har mulighed for at facilitere sådanne fællesskaber gennem undervisningstiltag som fx involverende undervisning (se tabel 3). Dette understreger igen, at institutionelle faktorer relateret til det faglige system generelt og undervisningen specifikt er centrale for at forstå og forebygge frafald. Fakultetspersonalets rolle ses direkte i tabel 3 i fænomener som *relation til, interaktion*

med og støtte fra undervisere samt *støtte og vejledning*. Derudover har fakultetsperso-nalet mere indirekte indflydelse på de øvrige fænomener.

Tabel 3. Studiemiljø - fagligt system

Fænomen	Teori	Empiri
Faglig integration og identifikation	Tintos begreb om faglig integration består af en objektiv del, som indbe-fatter at leve op til formelle faglige krav, samt en normativ del, bestående af intellektuel udvikling og dennes kongruens med institutionens faglige miljø (Tinto, 1975, s. 106).	Faglig integration, operationaliseret som en oplevelse af intellektuel udvikling, generel tilpashed og tilfredshed med studievalg (U. Larsen, 2000, s. 70), har en negativ sammenhæng med frafald i dansk kontekst (U. Larsen, 2000, s. 85).
	Faglig integration er, på trods af den tidligere nævnte kritik (Braxton & Hirschy, 2004, s. 91; Kuh & Love, 2000, s. 197), et dominerende begreb, der også indgår i mere individ-orienterede teorier om frafald (Bean & Eaton, 2000).	Esomonu og Okeaba (2016, s. 207) har udviklet et instrument til at måle faglig integration. Bestående af tre faktorer – følelsen af at høre til på universitetet, accept af universitetets regler og vær-dier samt deltagelse i undervisning.
	Faglig identifikation (Osborne & Jones, 2011) er et psykologisk funderet al-ternativt begreb til at beskrive de studerendes forhold til det faglige. Det er foreslået af Finn (1989), at studerende, der ikke identificerer sig med det faglige som domæne, vil falde fra. Dette er dog et relativt uud-forsket empirisk begreb (Walker, Greene, & Mansell, 2006, s. 3). Denne forståelse adskiller sig således noget fra den forståelse, vi jf. tidligere ser hos Holmegaard (2013), hvor det handler om identifikation med for-skellige kulturer. Domæneidentifika-tion taler således om identifikation på individuelt psykologisk niveau.	Her måles følelsen af at høre til både ud fra forholdet til medstuderende og undervisere, og det er således i højere grad social integration, der måles. Beg-ge studier illustrerer problematikken om bredden af Tintos begreber. Et enkelt studie bruger begrebet faglig identifikation for at distancere sig fra de mange divergerende forståelser af faglig integration (Elias, Masjuan, & Sanchez, 2012). Deres definition svarer i høj grad til Tintos forståelse af norma-tiv integration: kongruens mellem indi-videts og institutionens normer og værdier.
Oplevelse af arbejds-fællesskab	Arbejdsfællesskabet, forstået som læsegrupper, læsemakkere og gene-rel faglig støtte fra medstuderende må indplaceres i 'The institutional departure model' tilsvarende de for-skellige typer undervisning i figur 2. Et socialt fællesskab rettet mod det faglige er således en del af både det faglige og sociale system.	Herrmann m.fl (2012) finder, at stude-rende, der er en del af læsegrupper og oplever at kunne få støtte i studierne fra deres medstuderende, i større grad trives på deres studium. Hertil kan tilføjes, at ca. 15 % af frafaldne stude-rende fra Arts og Science and Techno-logy på AU oplevede at mangle støtte og feedback fra deres medstuderende (Aarhus Universitet, 2016a, 2016b).

Relation til, interaktion med og støtte fra undervisere	Tinto påpeger vigtigheden af interaktioner med fakultetspersonale, hvilket oprindeligt var forstået som en del af det sociale system (Tinto, 1975, s. 109), men i senere udgaver af modellen blev de anset som en del af det faglige system (Tinto, 1993) – se figur 1.	Pascarella (1980) har udviklet en teoretisk model, der er fokuseret omkring studerendes uformelle kontakt til fakultetspersonale som en central faktor for vedholdenhed, hvilket er empirisk understøttet af tidligere undersøgelser (Pascarella & Terenzini, 1977). Cotton m.fl. (2017, s. 69) finder, at støttende forhold til en 'voksen' enten udenfor universitetet eller blandt fakultetspersonale kan have afgørende betydning for vedholdenhed ved at understøtte både faglig og social integration. I dansk kontekst er en stærkere relation til undervisere også forbundet med en mindre grad af studietvivl (Herrmann, Troelsen, & Bager-Elsborg, 2015, s. 7).
Arbejdsbyrde	De studerendes oplevelse af arbejdsbyrden kan både forstås som en problematik relateret til studiemiljøet (Herrmann m.fl., 2012, s. 2) eller et spørgsmål om den enkelte studerendes faglige evner og evner til at planlægge sin tid (DMA Research, 2002, s. 12).	Studerende, der opfatter arbejdsbyrden som for stor, trives generelt dårligere på studiet (Herrmann m.fl., 2012, s. 7). 23 % og 30 % af de frafaldne på henholdsvis Arts og Science and Technology på AU angiver, at det var vanskeligt at overskue mængden af studiearbejde (Aarhus Universitet, 2016a, 2016b). Holm m.fl. (2008) finder, at for høje krav til tilstedeværelse kan give problemer – især for studerende med andre forpligtelser.
Karaktergennemsnit og læring	Karaktergennemsnit på studiet kan forstås som udtryk for objektiv faglig integration (Tinto, 1975, s. 106). Det vil sige, om den studerende formår at leve op til de formelle faglige krav. Karaktergennemsnittet kan også siges at relatere sig til læring, hvilket Tinto (1997, s. 615) inddrager som en faktor, der direkte påvirker vedholdenhed.	Et dansk studie af veterinærstuderende på KU finder, at en positiv udvikling i karaktergennemsnit undervejs i studiet er forbundet med en lavere risiko for frafald (P. Holm & Rasmussen, 2016, s. 26). Et studie af datamining til at forudsige, hvilke studerende der er i risiko for at falde fra, viser, at karaktergennemsnit på studiet er en væsentlig prædiktor (Jayaprakash, Moody, Lauría, Regan, & Baron, 2014, s. 27). Tilsvarende sammenhænge findes i andre studier (Al Ghanboosi & Alqahtani, 2013, s. 504), mens Hardy & Aruguete (2014, s. 558)

		identificerer en række psykologiske faktorer og faktorer på institutionen med betydning for karakterer på studiet.
Tidligere resultater, oplevelser af og skuffelser ved eksamen	Overordnet kan eksamen siges at have stor betydning for studerende og deres tilgang til studiet (Biggs & Tang, 2007, s. 163).	Eksamener, der lægger vægt på at aktivere de studerende samt på at forbinde til tidligere forudgående viden, har positiv sammenhæng med vedholdenhed (M. S. Larsen m.fl., 2013, s. 110), mens nederlag ved eksamen er mere almindeligt blandt frafaldne end vedholdende studerende (Yorke & Longden, 2004, s. 114) – også i dansk kontekst, hvor skuffelser ved eksamen øger risikoen for frafald (U. Larsen, 2000, s. 85).
Studiestart	Studiestart eller introforløb består i dansk kontekst ofte af en eller flere dage med en kombination af faglige og sociale aktiviteter, hvor de studerende gør deres første erfaringer med det faglige og sociale system (EVA, 2017).	En positiv opfattelse af den faglige og praktiske rammesætning i studiestarten er fundet at have statistisk signifikant negativ sammenhæng med frafald (EVA, 2017). Den faglige rammesætning er operationaliseret som oplevelsen af god introduktion til fagligt indhold og faglige krav og forventninger. Introduktion til studieteknik viser dog ingen statistisk signifikante sammenhænge med frafald.
Støtte og vejledning	Institutionen kan udbyde støtte til studerende igennem tutorer, mentorer og studievejledning. Se også studietekniske og introducerende kurser i tabel 4.	Personlige tutorer og forhold til personale på institutionen styrker studerendes vedholdenhed (Cotton m.fl., 2017, s. 69). Det er centralt ift. støtte tilbud på institutionen, at studerende er klar over, at de er tilgængelige, og ikke oplever, at de er til besvær, når de benytter dem (Cotton m.fl., 2017, s. 73). Bishop (2016, s. 213) konkluderer, at vejledningstilbud har en positiv betydning, og anbefaler et bredt udbud af vejledningstilbud, hvor studerende kan finde støtte og vejledning gennem hele studietiden som en god måde at støtte særligt studerende med høj risiko for frafald på (ud fra baggrundsfaktorer). Endelig understreger Ishitani (2016, s. 32) en problematik omkring det store fokus på førsteårsstuderende, hvilket resulterer i, at især førstegenerationsstuderende falder fra i løbet af det andet år, når der ikke længere er den samme grad af støtte.

Undervisning

Undervisning og praksis i klasserummet er flere gange blevet påpeget som et område, der har fået større opmærksomhed, men stadig mangler forskning i relation til frafald (Braxton, Milem, & Sullivan, 2000, s. 570; Tinto, 1997, 2007). Med reference til figur 2 har undervisningen betydning for vedholdenhed igennem både social integration, faglig integration og identifikation samt læring. Udover undervisningssituationen i sig selv er brugen af læsegrupper og cooperative learning oplagte eksempler på undervisningsrelaterede fænomener med relation til det sociale system. Undervisningen vil ideelt set bidrage til læring og den normative faglige integration ved at fremme intellektuel udvikling inden for faget. Her er fænomener som aktiv involvering, feedback, alignment og tydelighed i undervisningen centrale, da de kan bidrage til inddragelse i og forståelse af faget. Endelig bidrager undervisningen til den objektive forståelse af faglig integration i form af forberedelse til at kunne leve op til de faglige krav.

Tabel 4. Undervisning

Fænomen	Teori	Empiri
Oplevelse af undervisningskvalitet	Undervisningskvalitet er et bredt begreb. Studier, der ser på den overordnede betydning af undervisning, operationaliserer det fx som studerendes opfattelse af underviserens evner ud fra alment accepterede didaktiske faktorer (fx Braxton, Bray, & Berger, 2000; Nora, Cabrera, Hagedorn, & Pascarella, 1996). En række britiske studier benytter sig af eksterne vurderinger af undervisningskvaliteten baseret på inkluderende undervisning, inddragelse af studerende og underviserens kompetencer.	Braxton, Bray og Berger (2000) finder positiv sammenhæng mellem vedholdenhed og undervisningskvalitet forstået som de studerendes oplevelse af underviserens evne til at give instruktioner og præsentere tydeligt samt deres forberedelse og organisering af undervisningen. Larsen, m.fl. (2013, s. 111) gennemgår en række britiske studier, der alle sammenholder en ekstern evaluering af undervisningskvaliteten med frafald, og finder at højere undervisningskvalitet er korreleret med lavere risiko for frafald.
Læsegrupper/studiegrupper	Mindre grupper af studerende, som arbejder fagligt både i og udenfor undervisningen, kan ud fra 'The institutional departure model' forventes at have positive påvirkninger på både den sociale og faglige integration, da både social interaktion og faglig udvikling promoveres.	Larsen (2000, s. 85) finder ingen sammenhæng mellem frafald og brugen af læsegrupper. Herrmann m.fl. (2012) finder dog positiv sammenhæng mellem trivsel og den studerendes arbejdsfællesskab, herunder læsegrupper. Hertil kan det nævnes at omkring 15-20 % af de frafaldne studerende på fakultetet *Arts* og *Science and*

		Technology oplever at have manglet støtte og feedback fra medstuderende (Aarhus Universitet, 2016a, s. 58, 2016b, s. 5).
Alignment i undervisningen	Overensstemmelsen mellem læringsmål, undervisningsformer og evaluering - ofte benævnt alignment - er en anerkendt faktor i universitetsdidaktik (Biggs & Tang, 2007).	Alignment har vist sig at hænge positivt sammen med trivsel (Herrmann m.fl., 2012). Mendez m.fl. (2014, s. 116) påpeger vigtigheden af, at de mål, den enkelte underviser kommunikerer, er i overensstemmelse med de overordnede mål for kurset.
Tydelighed	Tydelighed i undervisningen, forstået som underviserens evne til at præsentere undervisningsindholdet klart og forståeligt, er et ofte brugt udtryk for kvalitet i undervisningen (Braxton, Bray, m.fl., 2000; Nora m.fl., 1996).	Et amerikansk studie påviser en positiv sammenhæng mellem vedholdenhed og underviserens evne til at præsentere tydeligt, herunder at give eksempler og svare tydeligt på spørgsmål (Braxton, Bray, m.fl., 2000).
Feedback	Feedback er en central faktor ud fra Hatties (2015) metaanalyse af, hvilke faktorer der influerer studerendes læring og læringsstrategier i videregående uddannelse. Her lægges der særlig vægt på feedback, som opleves som formativ af den studerende: "Feedback er information tilvejebragt til en lærende som svar på en handling med den intention at modificere den lærendes tænkning eller adfærd" (Shute 2008, p. 153-154).	Hardy og Aruguete (2014) har udviklet et måleinstrument med fokus på blandt andet feedback og støtte fra undervisere – dette viste signifikante korrelationer med interaktion med undervisere, deltagelse i undervisningen og karaktergennemsnit. Hvilket understøtter Tintos (1997) pointe om, at undervisningen har indvirkning på de studerendes forhold til både det sociale og faglige. Derudover påpeger Osborne og Jones (2011, s. 147) i en teoretisk udledning, at feedback øger faglig identifikation.
Aktiv læring - involverende undervisning med diskussioner og gruppearbejde	Aktiv læring kan pragmatisk defineres som, at studerende gør ting og tænker over de ting, de gør i undervisningen (Braxton, Milem, m.fl., 2000, s. 571) – herunder diskussioner, spørgsmål fra underviseren, rollespil, mv.	Troelsen og Laursen (2014) foreslår på baggrund af en sammenligning af danske og internationale studier, at danske studerende foretrækker involverende undervisning. Et dansk studie viser dog blandede resultater, idet studerende på studiet Nordisk oplever gruppearbejde som positivt, mens det omvendte gør sig gældende for HA-studerende (DMA Research, 2002, s. 13).

		Internationalt finder flere studier dog positive korrelationer mellem vedholdenhed (Braxton, Milem, m.fl., 2000) og engagement (Umbach & Wawrzynski, 2005) med henholdsvis gruppearbejde og diskussioner i undervisningen.
Højere ordens-tænkning (higher order thinking)	Højere ordens-tænkning indebærer, at de studerende tænker på højere taksonomiske niveauer om undervisningsindholdet. Herunder at tænke kritisk og kunne argumentere om undervisningsindholdet – i modsætning til undervisning, der promoverer udenadslære (Lewis & Smith, 1993).	Et amerikansk studie finder positive påvirkninger af higher order thinking på vedholdenhed og social integration (Braxton, Milem, m.fl., 2000). Studiet undersøger flere undervisningsrelaterede fænomener og kommer frem til den generelle konklusion, at underviserens handlinger har betydning for frafald (Braxton, Milem, m.fl., 2000, s. 581).
Cooperative learning	Blandt andet baseret på Vygotskys forståelse af læring fordrer cooperative learning aktiv interaktion mellem de studerende i undervisningen. Ved at centrere de studerendes interaktion med det faglige indhold omkring social interaktion øver cooperative learning indflydelse på både det sociale og faglige system.	Studier, der har beskæftiget sig med sammenhængen mellem cooperative learning og frafald, finder generelt en mindskende virkning på frafald (Mayhew m.fl., 2016; Pascarella & Terenzini, 2005). Ift. gruppearbejde generelt finder Braxton, m.fl. (2000, s. 580) en lille negativ sammenhæng med vedholdenhed, mens Nora, m.fl. (1996, s. 442) ingen sammenhæng finder mellem frafald og underviserens opfordringer til samarbejde.
Studietekniske og introducerende kurser	Kurser, der overordnet introducerer til studieteknik, og hvad det vil sige at gå på universitetet, antager mange former. Mest fremtrædende i forskningen er såkaldte førsteårs-seminarer. Disse formidler ofte både praktiske oplysninger og studieteknik (Harvey m.fl., 2006, s. 73).	En type supplerende undervisning, hvor særligt dygtige studerende faciliterer sessioner om studiekompetencer og strategier, har i en række amerikanske studier vist sig at have positive påvirkninger på vedholdenhed (Pascarella & Terenzini, 2005, s. 399). Udbud af studietekniske kurser kan forbedre de studerendes faglige præstationer og derigennem mindske frafald (Costabile, Cornoldi, De Beni, Manfredi, & Figliuzzi, 2013). En tilsvarende indsats er såkaldte

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		førsteårsseminarer, hvor nye studerende bliver undervist i basale akademiske kompetencer, og hvad det vil sige at gå på universitetet. Disse er udbredte i USA og har vist sig at øge de studerendes vedholdenhed (Harvey m.fl., 2006, s. 73; Mayhew m.fl., 2016; Pascarella & Terenzini, 2005, s. 400).
Studenterforsknings-programmer	Studenterforskningsprogrammer indebærer at de studerende skal foretage forskning, som en del af undervisningen.	En gennemgang af studier af *studenterforskningsprogrammer* konkluderer mindskende påvirkning på frafald (Pascarella & Terenzini, 2005, s. 406).
Oplevelse af sværhedsgrad	Hvor mange internationale studier (Tinto, 1975) beskæftiger sig med de studerendes manglende evne til at leve op til objektive faglige krav (academic failure), har danske studier i højere grad fokus på oplevelsen af sværhedsgraden.	Studier, der beskæftiger sig med frafald ex-post facto, dvs. efter frafaldet er sket, konkluderer, at frafaldne studerende ofte har oplevet det faglige niveau som for højt (C. Holm m.fl., 2008; Aarhus Universitet, 2016a, 2016b).
Sammenhæng mellem fag på uddannelsen	Sammenhængen mellem de enkelte fag/kurser på en uddannelse. Eksempelvis i forhold til progression af fagligt niveau, og at relatere undervisningsindhold til hvad studerende har lært i tidligere fag.	Et studie af data om karakterer og kursusbeskrivelser finder, at sammenhæng mellem de enkelte fag på en uddannelse er en vigtig faktor for kvalitet i undervisningen (Mendez m.fl., 2014).
Deltagelse i undervisningen	Tinto (1997) antyder, at deltagelse i undervisningen styrker de studerendes involvering i studiet og dermed sænker risikoen for frafald.	Cotton m.fl. (2017, s. 74) finder, at deltagelse i undervisningen styrker de studerendes involvering i studiet og dermed sænker risikoen for frafald. Dette bekræftes også af et spansk studie, der kvalitativt undersøger betydningen af mere involverende undervisning og mere deltagelse i undervisningen – de studerendes identifikation med både det faglige og sociale system blev styrket (Elias m.fl., 2012). Brug af læringsteknologier kan også anses for deltagelse. Jayaprakash m.fl. (2014, s. 27) finder, at antallet af sessioner i et online *learning management system* er en prædiktor for, om man er i risiko for frafald.

Diskussion

Gennemgangen af litteraturen med fokus på forholdet mellem institutionelle faktorer relateret til studiemiljøet (dvs. det sociale system, det faglige system og undervisning) og frafald viser, at en mangfoldighed af faktorer relaterer sig til studerendes frafald. 'The institutional departure model' viste sig at være et givtigt redskab til at skabe analytiske distinktioner i forståelsen af den studerendes møde med institutionen med afsæt i begreberne socialt system, fagligt system og undervisning. Samtidig blev de store overlap mellem kategorierne tydeliggjort i analysen, særligt faktorer i kategorien undervisning viste relationer til både det sociale og faglige system samt til integrationen i og identifikationen med begge systemer. Integrationen i og identifikationen med de to systemer synes derfor også at være gensidigt afhængig, som det indikeres ved den dobbelte pil i både figur 1 og 2. Dette tydeliggøres eksempelvis ved betydningen af *højere ordens-tænkning* på social integration, der samtidig har påvist sammenhæng med de studerendes tilgang til det faglige system (Lewis & Smith, 1993). En tolkning kunne være, at det socialakademiske system - i hvert fald når det gælder videregående uddannelser - ikke kan forstås som direkte koblet til det, der foregår i undervisningslokaler, henholdsvis til sammenhænge uden for institutionen. Det udgøres snarere af de studerendes løbende arbejde med at skabe mening som individer og med den undervisning, de deltager i, og de sammenhænge, de ellers indgår i.

Udover integration i og identifikationen med de to systemer påpeger Tintos (1997) model læring som en vigtig medierende variabel i forholdet mellem den studerendes møde med institutionen og beslutninger om frafald. Her kan tilføjes endnu en kritik af det brede teoretiske begreb om faglig integration med henvisning til Tintos (1997) reviderede udgave af sin model. I fald den faglige integration omfatter både den intellektuelle udvikling, og hvorvidt der leves op til objektive faglige krav, kan der stilles spørgsmål til, hvordan dette adskiller sig fra læring, som også indgår i modellen. Tinto (1997, s. 614) foreslår selv, at læring operationaliseres ved tests af forståelse af undervisningsindhold eller evner til at eksempelvis tænke kritisk, hvilket igen indikerer et stort overlap med intellektuel udvikling. Her kan begrebet faglig identifikation (Osborne & Jones, 2011) være et mere præcist teoretisk alternativ til at forstå de studerendes forhold til de faglige aspekter af studiet, eksempelvis som operationaliseret af Smith og White (2001). Faglig identifikation kan forstås som den studerendes intrinsiske værdisætning af det faglige og forståelse af det faglige som en del af deres identitet (Osborne & Jones, 2011, s. 133) eller som identifikation med forskellige kulturer (Holmegaard, 2013, p. 170).

Ved at opstille de identificerede studiemiljøfænomener i de tre kategorier socialt system, fagligt system og undervisning og samtidig differentiere mellem faglig identifikation, læring og social integration som medierende variable mellem den stude-

rendes møde med institutionen og frafaldsbeslutninger kan denne longitudinale proces beskrives mere præcist. Dette udmunder i vores besvarelse af forskningsspørgsmål 3: en syntese af en revideret og uddybet udgave af 'The institutional departure model'.
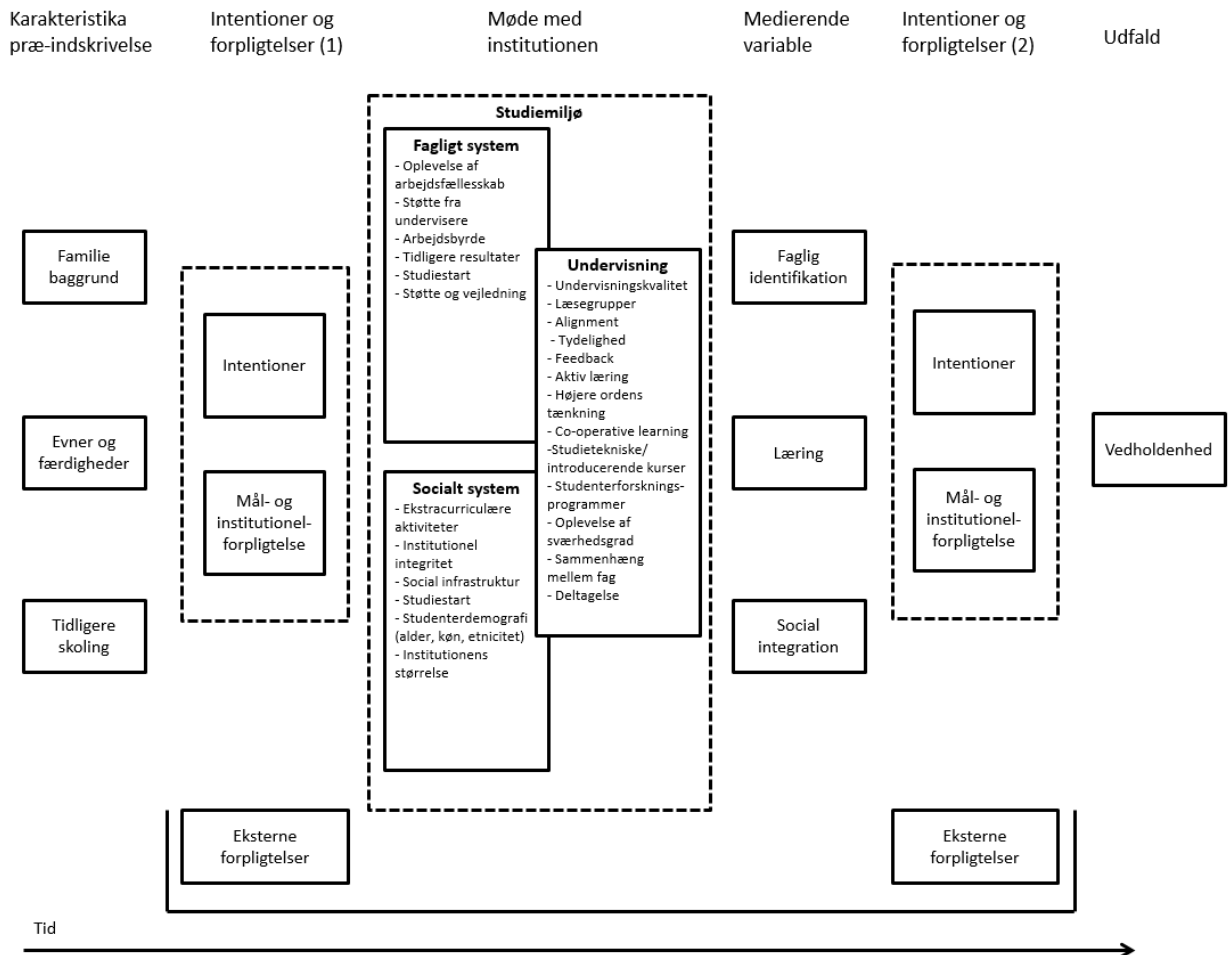
Figur 3. Revideret og uddybet udgave af 'The institutional departure model'

Den reviderede model bevarer den oprindelige logik fra 'The institutional departure model'. Der er kun ændret på de dele af modellen, der beskæftiger sig med de institutionelle fænomener og deres påvirkning på den studerende. Under paraplybegrebet studiemiljø er der tilføjet de fænomener, der er identificeret i den gennemgåede litteratur under de relevante kategorier. Undervisningskategorien overlapper det sociale og faglige system tilsvarende figur 2 for at indikere, at undervisningen er en del af begge systemer. Faglig identifikation erstatter faglig integration som medierende variabel for mødet mellem institutionen og vedholdenhed. Modellen er skitseret uden de kausale pile, der ses i figur 1 og 2, for at indikere, at kausaliteten forventes at være mindre stringent end i den originale 'institutional departure model'. Dermed ikke sagt, at modellen i figur 3 ikke forudsætter kausale forhold mellem de forskellige dele af modellen, men at disse kan være mangfoldige. Figur 1 antyder

eksempelvis, at påvirkningerne af individets forudsætninger på integrationen nødvendigvis medieres igennem deres intentioner og forpligtelser. Som påpeget af Berger & Milem (1999, s. 662) kan socioøkonomisk status have direkte påvirkning på social integration. Tilsvarende er den faglige identifikation som beskrevet ikke kun påvirket af fænomener i det faglige system, men også af fænomener relateret til undervisningen og det sociale system. Pilene fra den oprindelige model udelades derfor for at undgå en forståelse af, at kausalitetsforholdene er låst i de angivne mønstre.

Begrænsninger

Flere studier har påpeget vigtigheden af at skelne mellem studerende, der skifter studie, og de, der falder helt fra uddannelsessystemet (M.S. Larsen, Kornbeck, Kristensen, Larsen, & Sommersel, 2013, s. 96; Tinto, 1975, s. 116), da disse grupper kan være forskellige (Hovdhaugen, 2011, s. 244). Mange af dette studies gennemgåede empiriske studier foretager dog ikke denne skelnen - formentlig af pragmatiske årsager, da det kan være svært at opnå information om studieskift. Af denne grund skelnes der heller ikke i vores konklusioner mellem forskellige frafaldstyper. Langt størstedelen af den empiriske forskning, der omhandler frafald, er kvantitativ og baserer sig på tværsnitstilgange. Det vil sige, at de sammenhænge, der findes mellem frafald og faktorer, er korrelationer og derfor ikke påviser kausale sammenhænge. Dette er også tilfældet for de studier, der danner empirisk grundlag for denne artikel, hvorfor vores konklusioner også er præget af og begrænset af denne forudsætning.

De præsenterede resultater er baseret på international litteratur, men diskuteres primært i en dansk kontekst. Det kan dog ikke udelukkes, at den valgte empiri og de præsenterede fund er kontekstafhængige og dermed ikke vil kunne replikeres i enhver dansk - eller udenlandsk - kontekst. Vores formodning er dog, at resultaterne vil være at finde på tværs af forskellige settings. Dette vil eventuelle fremtidig empiriske undersøgelser af faktorerne præsenteret i tabel 2-4 kunne give nærmere svar på.

Konklusion

Der er igennem litteraturstudiet identificeret en lang række studiemiljøfaktorer med relation til frafald. Disse er primært funderet i empiriske studier og relateret til eksisterende teori. Overordnet kan de identificerede faktorer placeres i tre systemer: det faglige system, det sociale system og undervisning. Vi argumenterer for en ny eller udvidet måde at forstå studiemiljø på, hvor de tre systemer overlapper, idet undervisningen er en del af både det sociale og det faglige system.

Perspektivering

Samlet set viser de mange studier, at uddannelsesinstitutionen har en vigtig rolle at spille i frafaldsprocesser, og at fokus på baggrundsfaktorer (Smith m.fl., 2017, s. 31)

og selektion i optagelsesprocedurer (O'Neill m.fl., 2014; O'Neill, Hartvigsen, Wallstedt, Korsholm, & Eika, 2011) kan suppleres med analyser af mødet med institutionen. Særligt med henblik på social integration skal det understreges, at der fra institutionens side kan gøres en forskel. Hvis der ønskes at gøres indsatser mod frafald, kan den sociale integration med fordel tænkes ind i undervisning gennem tiltag med fokus på fx gruppearbejde (se tabel 3) og ikke blot overlades til de studerende. Hertil kan tilføjes, at kvalitet i undervisningen, både målt generelt og med fokus på koncepter som alignment og feedback, har en betydning for de studerendes frafaldsprocesser. Dette peger også på en pointe, som Tinto (2007, s. 7) fremhæver: Der mangler viden om betydningen af udvikling og efteruddannelse af undervisningspersonale og betydningen for frafald (og andre outcomes). Interventionsstudier og longitudinale studier vil her være oplagte supplementer til de mange studier baseret på henholdsvis ex-post facto (efter frafaldet er sket) interviews og korrelationer mellem frafald og administrativ data. Særligt interventionsstudier vil kunne være med til at oversætte forskningsresultater til handlingsmuligheder.

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Collective supervision of Master's thesis students: Experiences, expectations and new departures from the Security Risk Management programme

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Research article, peer-reviewed

Collective supervision has become a common way to provide supervision at schools of higher education. This is also true for the supervision of master's thesis students on the Master's Programme, Security Risk Management at the University of Copenhagen. Based on experiences with collective supervision of master thesis students, this paper engages with the many understandings of feedback and learning in play in the teaching situation. In the scholarly literature, features such as multivoicedness, dialogue, process- and student-orientation are emphasized when addressing collective supervision. Yet, our findings show a clash of expectations between a majority of the students (and supervisors) and these ideals of collective supervision. Indeed, many students still believe feedback should be troubleshooting and product-oriented. In the final part of the paper we outline a handful of ideas on how to improve future collective supervision to explicitly address the gap between expectations and conceptions of good feedback.

Introduction

Collective supervision and peer feedback are two catchwords in the current teaching and learning landscape at university level. Restructuring supervision into groups rather than giving individual feedback is not simply the prevailing answer to a request for better completion rates. The bulk of scholars working professionally with supervision seem to agree that collective supervision increases the learning outcome of the students (Jensen 2015; Barker et.al. 2014; Dysthe et.al. 2006).

In the Department of Political Science at the University of Copenhagen, collective supervision recently gained ground as a supplement to individual supervision for master's thesis students. The international master's programme, *Security Risk Management,* hosted by the Department of Political Science, has gone even further in this regard and offers only collective supervision for students on the programme. The first cohort of students to experience the collective supervision approach completed

their masters' qualification in the summer of 2016 and this paper is based on the authors' experiences with this first cohort and the students and supervisors' comments about collective supervision.[1]

The paper sketches out some of the core dynamics of feedback when supervising master thesis students in groups, including the fact students and supervisors often view this approach to supervision as second-rate supervision. The hope is that by prompting those involved to put forward their points of view the ground will be laid for discussions that could impact the implementation of collective supervision elsewhere in the future.

This paper is written in three parts. The first part briefly covers the key findings and arguments in the academic and pedagogical debates on collective supervision, in order to secondly discuss these findings in relation to the survey conducted amongst the students at the University of Copenhagen. This survey mainly focuses on the students' understandings of good feedback, peer feedback, their perception of the course design and their suggestions for how to improve it. Based on the survey findings, the conclusion highlights some of the issues for course design and communication on feedback that teachers need to address.

A short theoretical overview: collective supervision and peer feedback

What is good feedback?

The role of collective supervision in the writing of a master's thesis entails many additional aspects than core feedback,[2] and the feedback itself can serve many purposes beyond that of writing a good paper. In the course of writing and supervising a master's thesis, the aim of feedback is often narrowly related to the specific learning outcomes, yet it also serves the broader function of helping to enhance the students' skills for and engagement with lifelong learning. Thus, the process of giving and receiving feedback is, in and of itself, a 'technique' and a competence, envisioned to be useful later on in the professional life of students. Feedback is, in other words, both a means to writing a good paper (about the effectiveness of teaching) and an objective in itself (some*thing* to be learned).

Most scholars agree that this 'technique' of giving feedback is constituted by the acts of communication (both orally and written) taking place before, during and after the

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[1] The paper was initially written as Kira Vrist Rønn's final report for the TLHE-course (Universitetspædagogikum) at the Faculty of Social Sciences at the University of Copenhagen in June 2016, and Karen Lund Petersen served as the academic advisor for the project.

[2] In the following, we will apply the terms 'supervision' and 'feedback' more-or-less interchangeably. Yet, 'feedback' is primarily used when addressing the specific task of commenting on others' written work, whereas 'supervision' is used about the entire session, including general suggestions.

supervision sessions. And that all the actors attending the supervision sessions, provide and receive feedback.

Despite this agreement on the main elements of feedback, in order for it to be a competence and to be effective, there needs to be a way to define what good feedback actually entails, now and later in life. It would be somewhat naïve to claim the existence of a clear-cut answer to this question. One's notion of *good feedback* will depend on a variety of factors such as the student's and the supervisor's expectations, experiences, level of ambition, the set-up of the feedback sessions and much more. Nicol and Macfarlane-Dick have listed seven different answers to the question regarding good feedback and their replies range from the notion that good feedback 'helps clarify what a good performance is' to good feedback 'facilitates the development of self-assessment (reflection) in learning' and 'provides opportunities to close the gap between current and desired performance'.[3] Even though these replies differ a lot, recent scholarly work on feedback seems to agree that if the student is made *co-responsible* for his/her work, s/he becomes a 'more effective learner' (i.e., Nicol and Macfarlane-Dick 2006: 203). Thus, students' *responsibility* and *autonomy* are often mentioned as crucial elements when addressing questions about which factors contribute to high quality and high efficiency of learning (i.e., Dysthe et al. 2006). The core notion of students' responsibility and autonomy furthermore relates to the concept of *active learning*, which again constitutes one of the catchwords when approaching the academic field of teaching and learning. A pertinent question is however how university teachers might enhance student's learning in the course of writing a master's thesis by providing a teaching and learning environment in which the students can become active learners, be responsible and take change?

Collective supervision: from monologism to dialogism

When asked how to support active learning during the writing of a master's thesis, *collective supervision* is a common reply (Wickmann-Hansen et. al 2015; Nordentoft et al. 2013). Supervision in groups is not only seen as a way to enhance course completion rates or as a shield against the potential loneliness of writing a thesis ("specialesump"), the collective set-up is regarded as a didactic tool that encourages more active, and hereby better, learning (Jensen 2015, 2018). Olga Dysthe, one of the lead-

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[3] All seven statements about good feedback practice are presented as follows:
1. helps clarify what good performance is (goals, criteria, expected standards);
2. facilitates the development of self-assessment (reflection) in learning;
3. delivers high quality information to students about their learning;
4. encourages teacher and peer dialogue around learning;
5. encourages positive motivational beliefs and self-esteem;
6. provides opportunities to close the gap between current and desired performance;
7. provides information to teachers that can be used to help shape teaching. (David J. Nicol & Debra Macfarlane-Dick 2006: 203)

ing researchers in the field of supervision, has pointed out that supervision often is understood to rely on a 'supervisor-student dyad' (Dysthe et al. 2006): On the assumption that supervision and feedback are individual processes where the supervisor does most of the talking and the student is the passive receiver of the provided feedback. In her work, Dysthe emphasizes the potential weaknesses of this set-up in terms of an 'overdependence on the supervisor' and a 'lack of ownership' of the project (from the student's perspective) (Dysthe et al. 2006: 300).

Dysthe and her colleagues have tried out different set-ups for collective supervision in practice - for example by changing the supervision of master's students (on the Master of Education Programme at the University of Bergen) from individual supervision to a set-up including three different elements: 1) Supervision in groups (2-3 supervisors and their master's students), 2) Student colloquia (same students – no supervisor) and 3) Individual supervision (Ibid.). In order to assess the impact of these various forms of supervision, Dysthe and her colleagues draw on a conceptual framework developed by Mikhail Bakhtin.[4] The transfer of Bakhtin's framework to learning theory (initially proposed by Per Linell) addresses how knowledge emerges in different contexts and suggests a distinction between *monologism* and *dialogism. Monologism* is characterized by the understanding that 'knowledge is given' which is, in the view of Dysthe, reflected in 'traditional' individual supervision, where the authoritative supervisors 'transmit' feedback to more or less passive students. Monogolism thus supposes a scenario with a send-receive form of communication. *Dialogism* is, on the other hand, characterized by a notion of knowledge as something that emerges intersubjectively in the interaction. This understanding of knowledge as fundamentally co-constructed and negotiated resembles the one assumed in a collective supervision set-up where the students are themselves active in providing and receiving feedback (Ibid.). Below, the characteristics of the conceptual pair, monologism and dialoism are listed in order to illustrate, respectively, the supervisor-oriented and the student-oriented approach to supervision (adapted from Dysthe et al. 2006: 303):

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[4] Per Linell initially transferred some of Bakhtin's distinctions i.e. 'monologism' and 'dialogism' from Bakhtin's literary critic to pedagogical theory. We, like Dysthe et al., draw on Linell's application of Bakthin's conceptualization in the context of learning theory when using the two positions presented below.

Monologism	Dialogism
Supervisor-oriented	Student-oriented
One-way transmission of knowledge	'Multivoicedness' and the notion that 'knowledge emerges from interaction of voices'
The students are passive receivers of feedback	The students are active participators, and the setting is characterized by 'mutual engagement, negotiation and practices of repertoire in use'
Authoritative	'Internally persuasive' – 'co-construction of knowledge'

The question then is, whether collective supervision automatically transforms supervision from monologism into dialogism? Does collective supervision always result in co-production and negotiation, and are these attributes only associated with collective supervision? The answer to both these questions is 'no'. In some circumstances, a collective supervision setting could be largely made up of mini-lectures by the supervisor, and refer to clear hierarchies of knowledge, in which case it becomes monologism in a collective setting. In this kind of session the students would be neither active in presenting nor co-responsible for the feedback. Alternatively, it might be argued that, some individual supervision settings could easily be conducted in ways, which enhances dialogue, and therefore offer some of the alleged benefits of dialogism, without being collective supervision. Yet, it seems likely that in general the collective setting has the potential to support and enhance dialogism, since more actors are involved in active participation.

A number of scholars have studied the effect of active participation and dialogism on learning outcomes, most of which shows a positive relation. Dysthe et al.'s study on collective supervision is no exception. In their study on students' involvement in the supervision, they state that:

> *One of our clearest findings was that students benefited from involvement in fellow student's projects. Many students were surprised that reading and discussing peer projects was so useful for their own* (Dysthe et al. 2006: 303).

Thus, the inclusion of the students in the feedback process and the ability of the students to actively contribute to the provision of feedback to other students were proven to be defining elements for good feedback and experiences of high learning outcome.

The findings from the study on the three different supervision set-ups (supervision in groups, student colloquia and individual supervision) also show that the shift between the different set-ups had a positive effect on the level of self-confidence of the students and that it helped the students to voice 'their own opinions' without being over-dependent on the words of the supervisor (Dysthe et al. 2006: 314). Additionally, the study showed that one of the most important factors for the success of any

type of feedback is the 'relations component'. The students reported that "trust, safety, sensitivity and respect" are the key conditions if group feedback is to succeed (followed by factors such as structure, dialogue and engagement). Thus, when creating a good framework for active learning the personal and relational aspects should not be underestimated. Last, one of the most crucial findings is that good collective supervision 'does not happen by itself' – a range of critical factors need to be taken into consideration (Dysthe et al. 2006: 313).

Dysthe et.al. also provide a list of some of the 'critical factors' which could potentially hinder successful supervision in groups. These are listed below, since they are relevant to some of the experiences of collective supervision reported by students on the *Security Risk Management* programme. These factors, along with the findings of the study under discussion, also provide a foundation for future designs of collective supervision sessions. The seven factors are:

1. *Motivation*: understood as emphasizing 'the value of participating' in the supervision

2. *Engagement in peer projects:* understood as 'developing mutual knowledge and interests among students in each other's research projects',

3. *Training in feedback strategies*;

4. *Commitment*: understood as 'mutual obligation and personal commitment';

5. *Clear routines*;

6. *Multiple perspectives*: understood as bringing together 'different research traditions in the same group',

7. *Realistic time allocation* (Dysthe et al. 2006: 315-16).

This paper will now consider some of the specific experiences from the initial implementation of collective supervision in the *Security Risk Management* programme at the University of Copenhagen.

Experiences from the Master's in Security Risk Management

In the spring semester of 2016, 25 students, mainly from Western Europe, wrote their master's thesis as part of the international *Security Risk Management* programme. These 25 students were divided into four groups with four different supervisors. The collective sessions included the master's thesis supervisor and his/her 5-6 master's students.[5] Thirteen students, affiliated with different groups, responded to

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[5] Our set-up differs from the study reported on by Dysthe and her colleagues, e.g. in the sense that only one supervisor was included in the collective sessions. This fact could raise a discussion on whether the core idea behind the two versions of collective supervision are in fact compatible, since one of the most important issues connected to Dysthe's study was the disagreement between the supervisors and the contesting

a questionnaire relating to their experiences of collective supervision. The question-naire was sent out in May 2016 and it included 19 questions - 13 questions were de-signed with a multiple-choice answer and 6 questions invited elaborations in free text. The answers to the latter questions were subsequently grouped into themes (such as positive and negative experiences with feedback respectively from peers and the supervisor at the collective setting). The questionnaire was divided into the categories: 'The feedback at the collective supervision', 'General conditions for learn-ing at the collective sessions' and 'The learning process in general', and it entailed questions designed to identify the students' notion of good feedback; their experi-ences with the feedback provided by respectively their supervisor and their peers; and their general experience with collective supervision.

The findings presented in this paper, although based on a relatively small number of respondents, provide some indications and ideas important for planning and devel-oping future courses of collective supervision. The findings reported below are ex-amples of how the students typically replied when asked about their understanding of good feedback, their experiences with the supervisor and peer feedback and their general perception of collective supervision.

Students' pre-understanding of good feedback is product-oriented and equals trouble-shooting

The students' replies to the first general question regarding their understanding of good feedback included a lot of interesting perspectives. A common element in most of these replies is that their notion of good feedback is *instrumental* and *product-oriented*. The feedback should in the view of the students in some way or other point out flaws, misconceptions and unclear parts in the written text and the feedback session should additionally suggest ways of improving the text via new ideas and perspectives (in a constructive way). The product-oriented focus of the students is not surprising, since the final master's thesis constitutes the main achievement of the students, and this kind of student response is additionally supported by other studies from the scholarly literature on collective supervision (Wichmann-Hansen et al. 2015; Nordentoft et al. 2013). However, an underlying assumption of the stu-dents' notion of feedback seems to be that the provider of feedback (most often thought of as the supervisor) is responsible for identifying potential flaws, miscon-ceptions, unclear parts etc. In this way, the common understanding of good feed-back resembles Nicol and Macfarlane-Dick's sixth type of good feedback as some-thing that provides opportunities 'to close the gap between current and desired per-

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of authority that occurred in the wake of such situations. Our study did not entail a contesting of authority between supervisors in the same way; however, we did experience a move of authority from the supervisor to the students, since they were made responsible for the feedback on one of their peers.

formance', rather than having to do with the facilitation of self-assessment skills (type 2), or creation of a dialogue about general learning (type 3 and 4).

This rather narrow and instrumental notion of feedback as *troubleshooting*, reflected in the students' replies, conflicts with some of the broader virtues of collective supervision. Such broad virtues are that of (i) obtaining skills by giving feedback to peers (which will also change the roles and responsibilities of the thesis), and (ii) the ability to use feedback provided to others to reflect upon one's own work. The latter is again related to the students' ability to reduce reliance on the supervisor and take more responsibility for their theses.

Thus, in order to succeed with the collective set-up, a lot of attention needs to be drawn to the core adjustment of scope and expectation connected to the provision of feedback at the supervision session. This entails talks about how good feedback could potentially foster an agreement on a compromise between the product-oriented, instrumental and troubleshooting function of feedback and the more educative virtues, where co-responsibility and co-creation of knowledge are valued. This finding echoes recent studies on collective supervision where the importance of talking about the process when implementing collective supervision is underlined if one is to succeed with the collective set-up (e.g. Niclasen 2016).

Students' experiences with peer feedback are rather mixed

The questionnaire emphasizes various aspects of the students' experiences with peer feedback in the collective supervision process. In terms of the quality of the feedback provided from peers the experiences of the students are divided. Hence, five out of the 13 respondents rate the peer feedback in the lowest category, 4 in the middle and 4 in the top ranking.

The relatively high number of negative experiences with peer feedback differ in terms of content but tend to reflect the following statements that 'it is a useless concept on a fundamental level', because 'the supervisor can say the same things – in a better way'. That 'the peers don't read the material', and that the peers provide only stylish and superficial comments (something they Google just the day before supervision). Finally, time is an issue, as provision of peer feedback is very 'time consuming' and 'resource intensive'.

The more positive experiences with peer feedback are for example described in the following way: 'They [the peers] are really insightful and provide well thought out feedback. It is obvious that people have spent the effort to ensure they are providing feedback that is helpful'. Additionally, one student on the programme, who had a surprisingly positive experience with the collective set-up, wrote in her minutes from one of the first meetings that:

Honestly, I have been very skeptical about doing cluster supervision as it is very time consuming and I was not sure how I would benefit from reading other theses that are not related to what I am studying. However, I must admit that I am very positive about this approach after this first real cluster meeting. Peers have seen ideas and implications in my draft that I have not been able to see myself and [have helped to] guide me in the right direction.

There seems, however, to be no way of getting around the fact that the provision of feedback to the peers is time consuming and that it would in fact be much more convenient for the students to show up to a supervision meeting that only addresses their own project. However, the engagement in the projects of other students is at the heart of collective supervision. Thus, problems arise, if the students fail to see the point in engaging with the other students' projects (as reflected in the replies above) and if they in fact do not commit to and engage in the work provided by their peers. This would thus lead to a vicious circle where lack of engagement leads to bad peer feedback leading to further lack of engagement. When addressing the specific comment regarding the claim that the supervisor can state the points of the peers much clearer, proponents of collective supervision, would say that it is in fact valuable, if the students can formulate feedback, which resembles the feedback of the supervisor. The ability to provide good and useful feedback is an aim of the collective set-up in itself, even though some students might regard the repetition of the feedback as a waste of time.

Additionally, this example serves as a perfect illustration of the fact that many students see themselves as the main (and maybe only) learner, when their specific project is addressed at the sessions. It reflects a tendency to individualize the relation between student and supervisor, making learning a monolithic enterprise. Yet, the ideal notion of the learning actor(-s) is much broader in collective supervision and would ideally include all the other students during all sessions. This clarification might also be worth addressing, when presenting the collective set-up in the start-up phase of the supervision process.

The point of criticism concerning the core quality of the feedback provided by the peers is another issue. There are, however, ways of dealing with this issue so that the general quality of peer feedback improves. The quality of the peer feedback will naturally depend of the qualifications and academic level of the students providing feedback. However, a lot can be achieved by working with feedback forms and roles, and by encouraging the students to take on the role and responsibility connected to the provision of feedback. Some of the responses from the mini-survey indicate that a key reason for the poor ranking of peer supervision is lack of engagement. So the problem might not be lack of ability to provide good feedback, it seems primarily to relate to students not making preparation for collective supervision a priority.

In order to overcome this challenge, it might be worth emphasizing to the students some of the reasons why time spent on giving and providing feedback is a crucial element, e.g., by underlining that the collective set-up provides another way of thinking about supervision and feedback and it might be useful to carefully explain the distinctions between *monologism* and *dialogism* and some of the findings from Dysthe's and others' studies on collective supervision (e.g. Wichmann-Hansen et al. 2015). This would also be a way of acknowledging that good collective supervision will not just happen by itself (as Dysthe et.al. noticed) – it will require effort from both students and supervisor in order to make it happen.

In the programme under study, the supervisors were often positively surprised with the quality of the feedback provided student-student, which in some cases was very similar to that given by the supervisor. In these cases, we saw a good opportunity for the specific student to receive the same kind of feedback from different angles and thereby become increasingly aware of some of the crucial issues related to his/her project. In other cases, there was concern that the students might find the supervisor feedback too harsh, and thus demotivating. In these instances, the fact that another student provided the same kind of critical feedback from the student perspective, actually seemed to make the student more aware of the specific subject matter than if only the supervisor had highlighted the issues. There were also some cases where the feedback from the students motivated changes very different from those motivated by the supervisor's comments. This could potentially be confusing and counterproductive, yet in one specific case, the feedback was of a very high quality and based on in depth technical knowledge about the issues that could arise in the project discussed in the thesis. These cases provide some examples of good results from collective supervision, where the students did not just Google the topic of their peers' projects the night before in order to be able to provide some minimal feedback. Emphasizing such good examples and making it clear what constitutes good feedback, would be one way of working with the engagement-challenge related to peer feedback.

The students' experiences with collective supervision are quite negative

Only one student who answered the questionnaire gives a high ranking to the statement: 'collective supervision enhances student's learning'. When replying to the question concerning the 'most helpful aspects of collective supervision', the students point to the enhancement of ideas, the fellowship with the peers and the view that giving feedback makes you think. Over all, however, the students' replies regarding the benefits of the collective set-up seem to be more negative than positive. The negative replies reflect the inflexibility of the set-up (in terms of fixed dates, not necessarily fitting the need for supervision of the individual projects); the lack of focus

on the individual projects, the lack of structure of the meetings, the experience of inefficiency, a resource intensive set-up - just to mention some of the reflections.

When replying to the question concerning responsibility for the project, the students overwhelmingly felt that they are responsible for their own learning. This can both reflect the view that the students feel that they take the lead on their projects and become the active and responsible learners favoured by the learning literature presented earlier. At the same time, the reply might reflect a feeling that there is a lack of support from the supervisor. The questionnaire did not request elaboration of these answers so the core arguments behind these answers are not known. However, both options seem plausible. When looking at the suggestion for changes provided by the students, the provision of individual supervision sessions seem to be a common desire, which could reflect a feeling of lack of support for the individual student in the collective set-up.

Some of the responses in the survey are very negative towards collective supervision. By way of illustration, consider the following two replies:

> *It is a misconception that I should "learn" from the cluster sessions. I learn from writing the thesis and feedback should help make sure that I don't go down a wrong road. I think a lot of the time-waste associated with cluster supervision comes from the idea that I have any independent learning from the meetings themselves and from the experience of giving feedback to others. I don't.*

> *Cluster supervision should be abandoned – I can't see how it is advancing the skills of the student nor saving money.*

Naturally, these two quotes and the survey as such do not represent all the students. Yet, there is definitely a challenge related to working with and meeting these very negative attitudes towards the collective set-up. It is quite clear that the pre-understanding of good feedback and learning as such expressed in the first quote differs from the ideal of good feedback and the notion of learning associated with collective supervision. The student expresses a quite instrumental understanding of feedback and learning, where the role of the supervisor is to ensure, that the student does not go down any wrong paths. Again these findings are likewise expressed in other studies on collective supervision e.g. in Nordentoft et al. 2013 & Wichmann-Hansen et al. 2015.

Since the replies are anonymous, it is not known who replied in this very negative way. However, it seems as if the specific comments might have come from a very independent student, who might not consider supervision as a necessary aspect of writing a good thesis. Yet, these comments should not automatically lead to the conclusion that the collective set-up is less suited to stronger and more independent students. From the collective settings observed for this study, it is apparent that

some of the very advanced students are proud to put effort into providing their peers with valuable feedback and also find it rewarding to receive peer feedback even though one could imagine that the particular students would not benefit from the feedback from other students.

Perhaps, therefore, the best way to avoid the negativity towards collective feedback is to explain to the students the core ideas behind the approach and make an even bigger effort to explain and adjust expectations towards collective supervision. Even so, it is important to be realistic and accept that some students might be critical towards collective supervision no matter what is done in order to convince them otherwise.

A final concern, raised in the survey, is the fairness of the collective set-up and the shared attention from the designated supervisor. Here the survey shows how the collective set-up seems unfair to some students, because other students are good at hijacking the attention of the supervisor. A good and fair structure for the sessions, which allows for the feeling of a fair distribution of the time at the collective sessions, seems to play a crucial role for successful collective supervision. This is also one of the critical factors pointed out by Dysthe et. al (2006) in terms of 'clear routines' and 'realistic time allocation'.

While the negative attitude towards the collective supervision set-up sometimes comes from the students, the attitude of the supervisor is indeed also – or maybe even more - important in order to ensure good conditions for the collective supervision. The supervisor is the main authority in the group and therefore extremely important not only for conveying the message that collective supervision is the pedagogically sound choice, but also for providing the necessary structure and taking leadership to ensure learning.

Students' own ideas for improving collective supervision

The students provide some suggestions in order to improve collective supervision, some of which target the role of the supervisor as respectively 'leader', 'manager' and 'organizer'. These include amongst others the suggestion that more coaching in giving feedback should be provided, there should be better rules for feedback and supervisors should play a bigger role in organizing the sessions. In addition, many of the respondents would prefer the supervision in groups to be supplemented with individual supervisory meetings. Others again prefer written feedback in addition to/as an alternative to the oral feedback.

The request for more education on the provision of feedback is quite straightforward to satisfy when designing collective supervision in the future. The question about the provision of individual feedback as a supplement to the collective sessions is however debatable. In Dysthe's study, the supervision was made up of three ele-

ments that included both individual and collective supervision. It might be worth reopening this discussion on the balance between individual versus collective supervision sessions and, say, convert one of the six to seven collective sessions into an individual supervision session. This would be a way of reassuring each student that they are on the right track, since some students will need more attention from the supervisor in order to proceed in the writing process. With the *Security Risk Management* programme, something along these lines was tested when one of the collective sessions was converted into an individual session, and this proved to be a great success. The individual session (in the last part of the supervision period) constituted a good opportunity to ensure that all students were progressing and it served as an opportunity to address some of the questions that students feel less comfortable raising in the group (this point is likewise emphasized in Niclasen 2016). On the other hand, opening the door ajar for individual sessions could also run the risk of the collective sessions being seen as second-rate-supervision, which could potentially damage the crucial engagement of the students in the collective sessions even more. Thus, if individual sessions are offered, it should maybe only be offered in critical cases, where the students need specific attention in order to proceed, or as a replacement of only one of the six to seven collective sessions. The collective set-up should ideally constitute the 'norm' or majority of the meetings in order to create a feeling of belonging and create an atmosphere of mutual trust and dependence.

Some ideas for developing future collective supervision

Based on the survey, the authors' own experiences and the critical factors provided by Dysthe et.al., it has been possible to suggest some possible ways forward in order to provide even better collective supervision of master's thesis students in the future.

First of all, *the students' pre-understanding of good supervision and feedback* seems to be a main obstacle to the success of the collective set-up. When attempting to perform *dialogism in practice* by providing collective supervision and emphasizing peer feedback, the good and wanted outcome will not just happen by itself. An effort needs to be made in order to succeed, which is likewise in line with the scholarly literature on collective supervision. This effort could for example include the following six elements:

1. Make the virtues and core scope of collective supervision (co-responsibility, active learners etc.) visible to all students (the collective set-up is not a part of a cost cutting round, but is founded in studies on how students learn). This emphasis of the idea behind the collective set-up could be a means to meet the potential lack of engagement of the students and the feeling that the provision of peer feedback is a waste of time.

2. Clarify and adjust the various expectations and notions of good feedback in the group i.e., by referring to the types of good feedback identified by Nicol and Macfarlane-Dick.

3. Combine the collective set-up with individual supervision – once or twice at the end of the semester (the collective set-up should however constitute the main supervision set-up in order to enable students to see the progression of the other projects and create a feeling of belonging in the group).

4. Provide education in the provision of peer feedback in order to enhance the quality of the peer feedback and to enhance the engagement in the process.

5. Take the importance of the relational elements into account when planning the collective sessions. As suggested by Dysthe and her colleagues, we should think about the fact that mutual trust, sensitivity and a general good atmosphere boost learning.

6. Exploit the comparative possibility of the collective set-up more and be careful not only to provide individual supervision in a collective setting.

Secondly, despite the fact that collective supervision seeks to challenge the authority of the supervisor and share the responsibility of feedback and supervision between all the participants in the group, it is important not to forget *the role of the supervisor* as the primary asserting authority. The supervisor leads the sessions, provides the structure of the course and is the final examiner. In other words, a power structure is embedded in all kinds of dialogism, which is not to be misused but has to be used constructively to create a structured learning space. This involves, at a minimum:

1. A fair and clear structure for each session in order to ensure that each project and their commonalities are addressed.

2. Prepare not only for individual comments, but use the set-up to enhance the understanding of 'shared knowledge'.

3. Take the peer-feedback serious and take ownership by continuously trying to improve the quality.

4. Stick to the outline and the rules set up in the beginning of the course.

5. Use the student evaluations constructively.

Concluding remarks

The experiences with initiating a collective supervision set-up at the *Security Risk Management* programme discussed in this paper, do indeed echo Dysthe's claim that good collective supervision will not just happen by itself.

Implementing collective supervision successfully requires a lot of attention and focus from both students and supervisors. Both parties need to change the way in which

they usually think about good feedback and both need to engage actively in order to make the virtues of collective supervision flourish. Some experiences of adapting to the new set-up for the *Security Risk Management* programme have been discussed and ideas for new initiatives, which could fertilize the ground for good experiences with collective supervision in the future, have been highlighted.

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Introducing complexity and uncertainty of environmental models in the education of future engineers

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Practice paper, peer-reviewed

Environmental models are affected by significant sources of uncertainties compared to other engineering fields. However, traditional courses tend to provide a deterministic perspective, where the various sources of uncertainty (e.g. model structure, input data, implementation) are often neglected. This issue was highlighted during a university teachers' training programme, where the trainee proposed a solution that aimed to improve student understanding of uncertainty sources. The proposed solution was implemented in an existing MSc course (with 90 students). The course, originally based on problem-solving group work, was revised by introducing an assignment inspired by Problem-Based Learning, which can be used to introduce engineering students to complex issues. The new assignment introduced the students to new uncertainty sources (model structural and technical uncertainty) that are essential in the development and application of environmental models. The effects of the new approach on the students' learning were monitored by using course evaluation questionnaires and written feedback from the students. The open-ended assignment challenged the common habits of the students, highlighting the subjectivity in model applications and result interpretation. The students' response was mixed, with major concerns linked to the high workload, which limited the time for deep reflection. Nevertheless, the learning objectives were successfully achieved, providing future environmental engineers with better understanding of the complexity of environmental modelling.

Introduction

Mathematical models are essential tools that are used by environmental engineers to understand the behaviour of environmental systems and to predict the effect of possible strategies e.g. to assess pollution impacts, to predict the effect of different solutions on natural ecosystems and to design pollution control options. The complexity of environmental systems results in a great number of inherent sources of uncertainty, which therefore affect the outcomes of these engineering tools (Beven, 2009; Voinov and Shugart, 2013). Although sources of uncertainties in environmental modelling have thoroughly been investigated in the scientific literature (Warmink et al., 2010; Warmink et al., 2017; Matott et al., 2009; Refsgaard et al., 2007), the application of uncertainty analysis is still limited in practice (Beven, 2009). This issue is

also reflected in teaching programmes, where students are often provided with a deterministic vision of the model building and application process. The model building procedure is often schematized in an iterative step process (e.g. Carstensen et al., 1997; Jakeman et al., 2006) ending in a single solution.

Existing engineering courses traditionally follow this step-wise structure, but limited time is allocated to result interpretation and uncertainty assessment. During a training programme for university teachers, the author identified this as an important issue in the education of future environmental engineers. Teachers' feedback from specialized courses (e.g. courses from the last year of MSc education) underlined the students' need for handling the various sources of uncertainty affecting their modelling results in a more proficient manner. The author thus proposed a modification of an existing MSc introductory course on environmental modelling, based on the following concepts:

- There are several modelling approaches that can be used to solve environmental problems (model structure uncertainty)

- Modelling results are affected by several sources of uncertainty, including subjective choices made by the modeller him/herself (model technical uncertainty).

Enabling students to face the complexity stemming from 'real world' situations is among one of the strengths of Problem-Based Learning (PBL) (Zhou, 2012). However, a 'pure' PBL approach could not be applied due to logistical issues (see also the discussion in Holgaard et al., 2017), and a modified PBL approach was adopted. The course modifications were discussed with fellow university teachers (following the same training programme) and teaching counsellors before implementation. This new course structure was only applied to the final course module, specifically dealing with uncertainty analysis.

This article aims at showing how understanding of different sources of uncertainty can be introduced within the structure of existing environmental modelling courses. Specifically, the new approach introduced the students to model structural uncertainty and model technical uncertainty. The current course is first introduced, followed by a description of the new assignment and all the evaluation tools that were utilized to monitor the implementation of the new module. Finally, there is an overview of the results from the first three cohorts who took the new course.

Material and methods

Course description

The course (hereafter defined as *EnvMod*) is a 10 ECTS compulsory course that is taught on the first semester of a MSc programme on Environmental Engineering. *EnvMod* aims at introducing the basic concepts of environmental modelling to the

first-year MSc students and it represents one of the pillars of the entire MSc programme, since several other courses rely on the concepts introduced in the *EnvMod*.

EnvMod is organized around five modules, where students have to solve practical environmental problems and deliver a report for each module. Work is carried out by groups of four students, with a formative evaluation and a final oral exam focusing on the best reports of each group.

Auditorium-based teaching is reduced to short lectures (maximum 30-45 minutes twice per week), with most of the teaching activity taking place in the computer room, working on the five assignments. The topics of the assignments are directly linked to the research activities of teachers and teaching assistants: the assignments are therefore changed every 2-3 years in order to keep them updated with the changing teaching assistants and the latest developments in research.

The level and background of the *EnvMod* students is heterogeneous: 58% of the students (57 out of 98 students- data for 2015) have a BSc from other universities (both Danish and foreign). This variety results in a broad range of experiences: depending on country of origin and previous educations, students can either have a strong background in mathematical modelling or be completely unfamiliar with the core elements of the course.

The learning objectives of *EnvMod* cover all the medium-low levels of understanding in Bloom's (SOLO) taxonomy (Biggs and Tang, 2011). The engineering skills developed by the students in *EnvMod* include the ability to (a) use different models and software to solve a range of environmental problems, (b) interpret and present simulation results, (c) apply models and critically analyse their results with respect to measurements from natural systems.

The core elements of the course follow the classical structure for model development (Figure 1): (i) formulation of environmental problems, (ii) analysis of available data, (iii) definition of model structure, (iv) diagnostics of the model, (v) evaluation of model performance and (vi) model application. The development of the modules follows the model building framework, (e.g. Module 1 and 2 focus on points i-iii), with model application (point vi) common to all the modules. These core elements are general and they are useful in any environmental field, i.e. the students will use them irrespective of which study line he/she will choose and which field of environmental engineering he/she will work in after graduation. This is stressed by the fact that (as mentioned earlier), the actual content of the modules (e.g. which model is applied, which environmental problem is analysed) depends on the teachers and teaching assistant of the course, i.e. they change every 2-3 years.
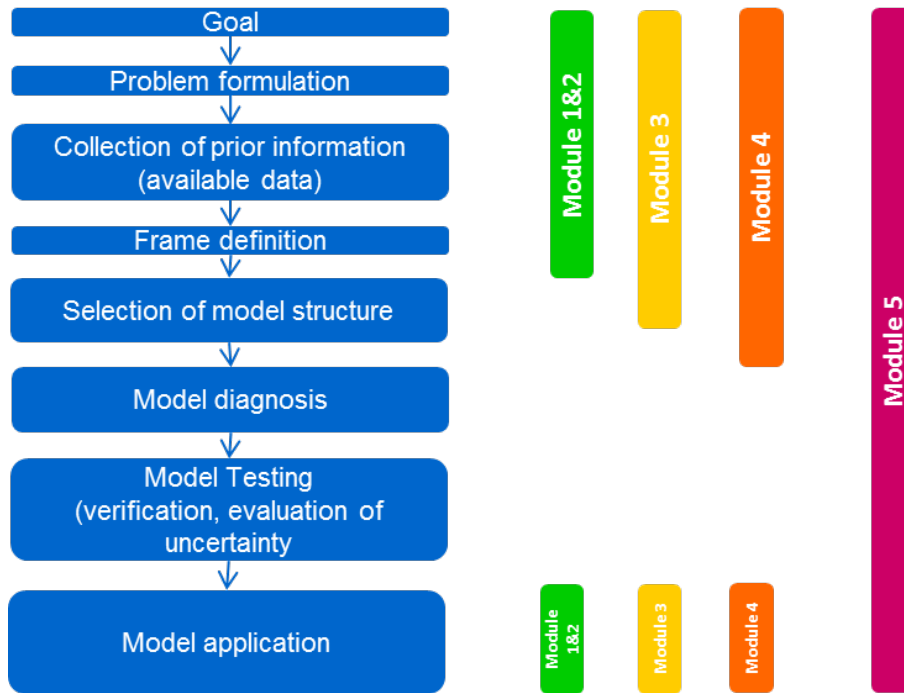
Figure 1: Schematic representation of model building exercise (adapted from Carstensen et al., 1996) and relation to the modules in the EnvMod course.

The core elements and the learning objectives develop in parallel, with the core-elements linked to the lower level of understanding dealt with in the first modules, while higher understanding is required for the last core elements, dealing with evaluating model performance.

An important challenge for the students is represented by the workload: the course covers a wide range of topics, with the students using most of their time to solve the assignments rather than deepening their understanding of theoretical concepts. This excessive focus on practical work is exacerbated by the fact that many of the students have poor programming skills, i.e. more time is required to solve the part of each assignment, which deals with coding. Nevertheless, the *EnvMod* course is one of the most appreciated courses in the department, always gaining a high score in the student survey for 'best course of the year'.

New Problem-Based module

According to the definition listed in Refsgaard et al. (2007) *'a person is uncertain if s/he lacks confidence about the specific outcomes of an event. Reasons for this lack of confidence might include a judgement of the information as incomplete, blurred, inaccurate, unreliable, inconclusive, or potentially false'.* The structure of the *EnvMod* course, on the other end, runs the risk of making students overconfident about the quality of the modeling results. Presenting only one methodology to address the steps of the model building process might prevent the students from fully understanding the

complexity of environmental modeling. This was highlighted as an issue by several teachers in specialized MSc courses, i.e. in courses that build upon the knowledge provided by *EnvMod*. The proposed modifications to *EnvMod* affected Module 5, which deals with identification of sources of uncertainty, assessment of model performance and quantification of the uncertainty of the simulated results. As shown in Table 1, the previous structure only dealt with two locations of model uncertainty (as defined in the terminology proposed by Warmink et al., 2010 and Walker et al., 2003), i.e. parameter and input uncertainty. Limiting the students' work to these two uncertainty sources might result in a biased, overconfident perspective on the model's ability to simulate environmental processes.

Two additional levels, which are essential for the professional life of future environmental engineers (namely model structural and technical uncertainty), were thus included in the module. Also, the module structure was modified from 'problem-solving group work' assignment to a 'supervised' problem-based approach. In the 'problem-solving group work' (still used in the previous four assignments) students have to solve a problem by applying a pre-defined tool and methodology. In the 'supervised' problem-based approach (Figure 2), the students are given several choices in terms of model structures and tools for model analysis (sensitivity analysis, parameter estimation, etc.). In this manner, the students were encouraged to switch from a 'passive' status ('I chose to use this model because the teacher told me to do so') to a more critical behaviour ('I chose to use this model because I think that it is more appropriate to solve my problem').

Given the characteristics of the course (a great number of students, divided in small groups of four people, the limited background of most of the students in the field of environmental modelling) a 'pure' Problem Based Learning approach was not judged to be appropriate. This was supported by the PBL discussion in Holgaard et al. (2017), which underlines the importance in allocating sufficient resources in order to better outline the problem. Given the short duration of Module 5 – it is only allocated 3 weeks - the full benefits of PBL in terms of creativity and innovation cannot be achieved. In fact, the students would not have sufficient experience and/or time to build their own understanding of the problem and then select the most appropriate tools. Instead, a 'supervised' approach ('restricted learning') was chosen: the students were given a problem to solve, but they also were provided with a range of equivalent tools. The students then discussed and decided which tools were the most appropriate for their task, and they were required to argue for their choices by using the information available in the course reading material.

The new structure of Module 5 is schematized in Figure 2 and it is subdivided into five steps:

1) Problem is defined: students get a task, i.e. an environmental problem to solve (in 2015 the assignment dealt with modelling of wastewater flows in urban drainage systems). No indication on how the problem should be solved is provided.

2) Three different and equivalent model structures are provided. The students have to choose the model that they judge as the most appropriate to solve their task.

3) Two methods for analysing the model (sensitivity analysis) are provided. The methods differ in complexity and details of their results. The students have to choose the methods that they regard as fulfilling their needs.

4) Similar to previous step: two methods for parameter estimation are provided, with the students choosing the most appropriate for their purpose.

5) A peer review step is introduced: each group has to evaluate the work of other groups, i.e. the students have to critically analyse the work and the choices made by their peers. In this step the students do not only learn to evaluate somebody else's work, but they also get the chance to compare and critically evaluate their choices (i.e. other groups may have solved the same task in completely different manners, possibly questioning the choices made by the group being reviewed).

The increased workload associated with the new structure (e.g. by the peer review process) is compensated by a decrease in the programming assignment: the students are given turnkey models rather than having to program the models themselves. Compared to the previous assignments of *EnvMod*, the new structure requires fewer 'practical skills' (programming) and more 'thinking'. This is consistent with the fact that towards the end of the course a higher level of understanding is required.
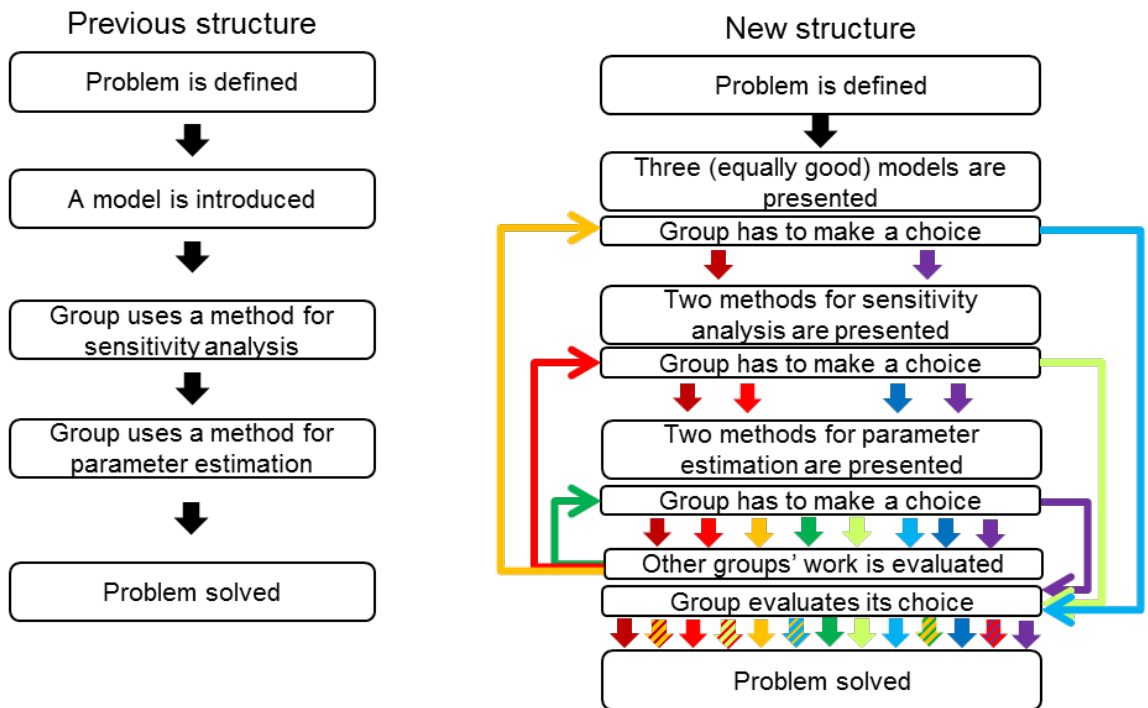
Figure 2: Schematic representation of model building exercise (adapted from Carstensen et al., 1996) and relation to the modules in the EnvMod course

Location of uncertainty	Previous assignment structure	New assignment structure	Example
Context			Lack of understanding of the natural process
Input	X	X	Errors in measurements
Model Technical		X	Effects of choices in terms of software, analysis tools, mathematical solvers
Model Structure		X	Different mathematical descriptions for describing the same natural process
Model Parameter	X	X	Natural variability of processes requires different optimal parameter sets

Table 1. Schematization of locations of uncertainty (adapted from Warmink et al., 2010; Walker et al., 2003; Refsgaard et al., 2007) that are addressed in the course module.

Evaluation of the new module

Several methods were used to monitor the implementation of the new module structure:

- A pre-testing test, carried out in the days before the start of Module 5, the results of which were actively discussed in the first class. The pre-test focuses on the preconceptions that the students might have on the applicability of environmental models, and it is therefore designed to challenge the students and their 'engineering common sense', i.e. mental structures which have been built throughout their engineering education but which might represent an obstacle to a successful use of the core elements of the course. The quiz is used to introduce and explain the structure of the assignment (which differs from the previous four).

- The standard course evaluation questionnaire, which is provided to students at the end of all the university courses and which enables comparison with previous academic years. The questionnaire also includes a free comment field, which usually provides the most important insight into the students' perception of the course (i.e. students can provide more comprehensive feedback to teachers).

- A supplementary Course Experience Questionnaire (CEQ) based on Ramsden (1991) and with specific questions developed in collaboration with the university's teaching counsellors.

- Oral feedback and discussions between teachers and students during the activities in the computer room. This oral feedback was subsequently discussed among teachers and teaching assistants.

Results and discussion

Implementation

The new Module 5 in *EnvMod* was introduced for the first time in the autumn semester of 2015, and it covered the last three weeks of the course. During this period, there were lectures of approximately 30-45 minutes twice a week during the first two weeks. In the last week there was a peer-review assignment, while all the remaining time (approximately 3 hours twice a week, for all the three weeks) was reserved for practical work (tutorial and exercises) in the computer room. The peer review was performed on a draft version of the final assignment, and the students had to evaluate the work of their peers based on guidelines which were presented during the lecture. Each group added the feedback they gave as appendix for the final report (i.e. the peer review was a part of the final summative assessment).

In order to provide the students with the necessary support to complete the new formulation of the assignment, an existing tutorial was updated, and a completely new tutorial was created. All the slides from the lectures were created for this assignment (i.e. very little of the lecturing material was recycled from previous years). Only the reading material was not changed compared to previous editions of the course.

The pre-testing quiz consisted of ten questions and it was carried out in the 24-hours before the start of Module 5. The CEQ was launched in the last week of the course and it was closed at the end of the evaluation period (two weeks after the delivery of final report). Students were informed about the changes to the course structure, the reason for the increased number of tests and evaluation questionnaires that were given during the three weeks, and the fact that the new structure was developed as part of the teacher training of the author.

A total of 90 students followed the course, with 75% answering the overall final evaluation of the course and about 69% answering the CEQ.

Students' overall evaluation

Despite the different structure compared to the previous four assignments, Module 5 was well received by the students. Based on the results from the CEQ, about 76% of the students agreed that the assignment was 'intellectually stimulating', 71% found the assignment 'motivating' and 63% found that the assignment improved their problem skills. These results show that the main rationale behind the new module (improving critical thinking and avoiding 'passive' behaviour when applying environmental models) was successfully achieved.

The students also appreciated the peer-review exercise (where each student group had to evaluate the assignment of another group), even though this subject was not addressed in depth in any of the standard evaluation questions. Most of the groups used the entire lecture block (3 hours) for the peer-assessment, while they could easily have decided to complete it in the quickest possible manner ('saving' precious time to continue their work on the main report). Also, no negative comments were made on the peer-review process itself in the main course questionnaire, underlining the students' appreciation of this task.

The students actively discussed the topics related to the assignment during the lab activities, especially focusing on 'real-life' problems linked to e.g. data availability, computational resources, project time management. These discussions increased the students' awareness of the uncertainty linked to the application of environmental models.

A main reason for this successful implementation can be traced to the careful planning of the new module. After discussions with the fellow teacher trainee and the

teaching counsellors, the new structure was also thoroughly discussed with the course leaders, which meant it was possible to fine-tune the workload and lecture content to the skills of the students. Close interaction with the course teaching assistants also ensured that the exercises and tutorials matched the level of the course. This is part of the 'quality assurance' that has ensured that the *EnvMod* course has been highly rated over the years, despite substantial changes in its content.

Pre-testing quiz

The pre-testing quiz was designed to challenge the students and their 'engineering common sense'. The quiz was mainly intended as a tool to introduce the new module, and its results were used to exemplify some of the issues that were subsequently addressed during the course. The students had limited time to answer the questions, and they were expressly invited not to use more than 10 minutes to answer the entire questionnaire (i.e. a maximum of 1 minute per question). This was intended (i) not to increase the workload of the students, and (ii) to force the students to give a quick, not well reasoned answer, in order to highlight their pre-concepts, which might lead them to non-optimal choices (in an environmental engineering context).

However, several students complained about the pre-testing quiz, and they considered it a waste of their time. After a discussion with the fellow teachers, several factors were suggested to explain this negative feedback:

1) Scheduling of the quiz: there was an overlap with the deadline for the previous assignment (Module 4), resulting in an increase in student stress;

2) The discussion of the quiz results was carried out orally and – despite serving as an introduction to the module – was not seen by the students as 'useful teaching', i.e. without theoretical content that could help them pass the final exam;

3) The early scheduling of the lectures (starting at 08.00), which meant that almost half of the students entered the classroom 15-20 minutes after the start and thus missed an important part of the introduction and quiz discussion.

Course Experience Questionnaire

The average CEQ scores are listed in Table 2. Generally, all the scales scored above the average, with the exception of the appropriate workload (AWS). The workload is a major issue in *EnvMod*, and Module 5 was not an exception. Almost 57% of the students answered that they had too little (or just enough) time to fully understand the topic of the assignment.

Based on the students' comments, additional stress factors, which were specific for Module 5 were identified as:

1) Structure of the tutorials: the main structure of the two tutorials given to the students (both the updated and the new one) was not changed in the new version of the module. The tutorials consisted of a series of steps and procedures that the students had to follow to be able to run the models and to complete the assignment. No clear explanation of these steps (e.g. why the students had to make that specific step) was provided in the tutorial, which therefore lacked a clear connection with the theory which was illustrated in the lectures. This structure did not align with the main philosophy of Module 5- 'understand what you are doing' - which meant that the students had to do additional work.

2) Practical issues linked to the code: the use of new models and of new codes resulted in small software errors, which were promptly corrected during the lab exercises by the teaching assistants. Despite being minor issues, which were solved in a short amount of time, these delays added up in an already tight course schedule, resulting in the perception of an increased workload.

Scale	Average Value
Good teaching (scale) [GTS]	3,80
Clear Goals and Standards (scale) [CGS]	3,31
Appropriate Workload (scale) [AWS]	2,90
Generic Skills (scale) [GSS]	3,53
Motivation (Scale) [MS]	3,66

Table 2. Average scales of the Course Experience Questionnaire.

Another index which could be identified as problematic is the *Clear Goal and Standards* (CGS) scale. In the questions related to CGS, a group of 15-20 students (around one third of the student who responded to the CEQ) chose values below the average, with the greatest number (21) expressing values below the average for the question '*It was often hard to discover, what was expected of me in this assignment*'. A partial explanation for this is the inherent structure of the assignment: given the different combination of models and tools, the students had at least 12 different ways of solving the same assignment.

Therefore, the requirements for the assignment were quite generic (e.g. one of the questions introducing the choice of the model was '*Use your current professional knowledge in the choice (e.g. hydrology). Do not choose randomly, but find some arguments behind your choice*'), and some students might have found it difficult to organize their work based on these open-ended questions.

Furthermore, some of the comments suggested that the requirements for the draft report that had to be evaluated in the peer review were not really defined. This was a deliberate choice (students had to submit what they had prepared by the deadline) that was made to avoid putting further stress on the students. However, this might have contributed to the students feeling unclear about the expected standards.

High scores were obtained for the Motivation Scale (MS) and Good Teaching Scale (GTS). The entire assignment was designed to encourage active learning from the students by not simply asking them to follow a list of programming instructions. The students learnt about the different structure of the assignment compared to the rest of *EnvMod* during the first lecture, and they were reminded about the importance of using a critical approach in their choices throughout the entire assignment. All these elements have helped to motivate the students, thereby resulting in a good MS value. Similarly, the teaching team put a lot of effort into delivering the new model and the students recognized this input.

Standard course evaluation questionnaire

The overall evaluation of *EnvMod* was in line with the previous year when it was among the department's best scoring courses. There were no specific comments about the new formulation of Module 5. This suggests that the new module was well integrated in the course, maintaining the overall 'storyline' and high quality. Specific comments were made on the theoretical level of the lectures and on the understanding of modelling tools provided in Module 5.

The lectures were organized to provide a general overview of the different tools and topics, and they were limited to 30-45 minutes for each teaching day. A detailed description of the methods and tools that were introduced in class was available on the course homepage. However, the link between the reading material and the lecture topics was not clear to all the students.

The students were provided with pre-compiled models to reduce the 'uncritical' workload for the students (i.e. programming): the students had only to make minor modifications to the code in order to complete the assignment. Although this situation resembles real life applications, where practitioners apply environmental models without spending time on a detailed analysis of the simulated processes, some students were frustrated by this approach. Some of the most active student groups asked for detailed information about the code and models, and they could easily handle this detailed information. On the other hand, other groups had a limited

knowledge of the programming language (MATLAB), and they showed difficulties handling the limited programming work required in the assignment.

Overall, there was an alignment between the CEQ and the standard course evaluation. The majority of the students gave positive feedback about the proposed changes, and were appreciative of the new teaching method that was used.

Assessment of students' learning

The formative assessment was mainly carried out through interaction with the students during lab activities in the computer room. Given the high number of students and the physical settings for these activities (students were working in two different rooms), it was only possible to interact with a limited number of students at any one time. Issues that arose during these activities were subsequently addressed in the following lecture for the whole class. Therefore, the formative assessment had a direct influence on the lectures' content.

Both the final grading of students' reports and the formative assessments supported the fulfilment of Module 5 learning objectives (LO), namely the utilization of state of the art modelling tools and the integration of models with data from real environmental systems. The students, in fact, encountered some of the typical challenges faced by environmental engineers in real-life applications. For example, the available model structures failed to describe all the processes that were described by the available datasets. This underlined the models' structural limitations, and prompted the students to reflect on the various sources of uncertainty affecting their model simulation results.

The peer review exercise forced the students to critically analyse the work of their peers, as well as their own work. The students were explicitly invited to focus on the arguments used in the reports, rather than looking at 'marginal issues' (with respect to the LO), such as calculation errors or report layout. The level of the analyses performed during the peer review was consistent with the overall level of understanding of each group: student writing good reports, showing a deep knowledge of the topic, also wrote good reviews. It should be noted that the students had to review reports from groups with similar skills (trying to avoid the situation where good students had to review poor reports, and could not show their full understanding of the topic, or poor students reviewing good reports but providing poor feedback).

Since *EnvMod* is timetabled in the first semester of the MSc education and the LO cover medium-low levels of the Bloom (SOLO) taxonomy, students were presented with different models and tools (which can be applied in the following steps of their MSc education) and detailed, deep theoretical descriptions of the methods were not included in the teaching. However, the students will benefit from most of the compe-

tences gained in *EnvMod* in the other modelling courses, as well as in their future engineering careers.

The results of the summative assessment of Assignment 5 were in line with the results of the previous assignments (see Figure 3), suggesting that the level of understanding of the different student groups was not significantly affected by the switch from problem-solving to a problem-based learning approach. Groups that performed well in the previous part of the course also had a good grade in Module 5, and vice versa.
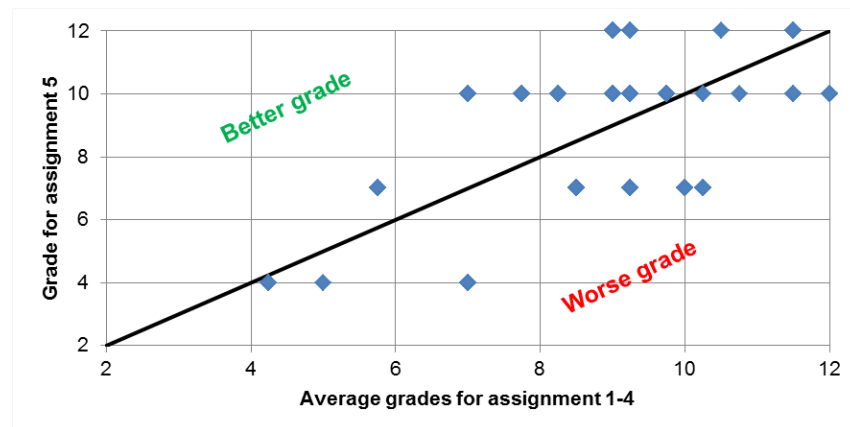

Figure 3: Comparison between average grades obtained for assignment 1-4 and the grades obtained for assignment 5.

Also, the results of the oral examination were in line with those of the written report: no major changes in the grade had to be made after the exam, when compared to the initial grade based on the reports. Evaluation of group reports cannot clearly show if all the students had achieved all the desired LO (for example, work subdivision within a student group might result in a student achieving a LO but neglecting another one, and vice versa). However, the alignment between the written and the oral examination confuted this concern, suggesting that all the students had achieved the desired LO for Module 5.

Overall, the effect of the different working approach required in Module 5 (compared to previous assignments) can be exemplified by one of the comments in the standard questionnaire: '*It's a good final assignment, where you think a bit more about what your model actually does, rather than just trying to make it work*'. This shows how this student felt that he/she had achieved a wider perspective on applications of environmental models (i.e. confidence in the model results), rather than focusing on low-level issues (e.g. debugging).

Improvements based on students' feedback

Given the positive feedback for the new structure of Module 5, the structure was permanently adopted in *EnvMod* and it was successfully taught in autumn 2016 and

2017. Based on the detailed feedback from the 2015 semester, the following improvements were made:

- The pre-testing quiz was modified: to avoid overlapping with other deadlines, the quiz was performed during the first class by using an on-line response platform (clickers)

- The workload was decreased, by improving the tutorials and bug-checking all the code. Also, explicit references to the teaching material and lecture topics were included in the tutorials.

The theoretical content of the lectures was slightly increased (around 10 minutes) without changing the complete philosophy behind *EnvMod* (with most of the course time still spent in the computer room). Links between the topics introduced in class and the available reading material were created. Even though this does not fit with the philosophy of a 'pure' Problem-Based-Learning, when students would be expected to find relevant information by themselves, it was a useful adaptation considering the limited time available.

Additionally, some students suggested that Module 5, which focuses on analysing the behaviour of model tools (rather than creating a new model, as is the case in other *EnvMod* assignments) could be built upon some of the models from the previous assignments. This possibility is still under implementation for the next editions of *EnvMod*.

Conclusion

This case study demonstrates how complex concepts such as uncertainty in the application of environmental models can successfully be integrated in existing courses. The implementation of the new Problem-Based structure, judged as the most appropriate to achieve the learning objectives of Module 5 of *EnvMod,* was a great success. The critical thinking of students was improved, as well as their understanding of the concepts involved in uncertainty analysis. This is an essential skill for a successful application of environmental models.

The students worked with different tools for uncertainty analysis, addressing an increased number of sources of uncertainty, such as model structural uncertainty and model technical uncertainty. Despite several constraints such as limited time (only three weeks), the high number of students (90) with different background knowledge (for the majority of students this was their first semester of the MSc education), the balance between practical work and lecturing (with the latter reduced to only 30-45 min), the new structure successfully achieved the intended Learning Objectives. This has been supported by careful planning from the teaching team and by the tools

provide by the teaching counsellors as part of the university teaching training programme.

The constraints posed by the *EnvMod* course required an adaptation of the 'pure' Problem-Based Learning approach in order to avoid an increase in the students' workload. The substitution of the previous 'restricted' problem-solving with an open-ended assignment received positive feedback from the students. This assignment, where the same task could be completed in different manners, resembles real-life cases, where environmental modellers can make several subjective choices that affect their final results. The use of peer-review to increase awareness of these sources of uncertainty proved to be effective.

The evaluation tools that were set up as part of the university teaching programme (e.g. CEQ) gave useful insights into the students' learning processes and provided feedback for improvements of *EnvMod.* The students are now able to successfully work with the complex but essential topic of uncertainty in environmental modelling, making them capable of applying the most appropriate modelling tools to solve environmental problems.

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Skriv og skriv – red din opgaveskrivning

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Stine Heger og Helle Hvass

Samfundslitteratur, Frederiksberg (2018)

Hvordan redder studerende sig gennem eksamensperioder med skriftlige opgaver? Hvordan inddeler man som studerende sin skriveproces i faser? Hvad er det for krav, der knytter sig til opgaver på videregående uddannelser?

Disse spørgsmål er udgangspunktet for Stine Heger og Helle Hvass' nye skrivehåndbog, der introducerer studerende for arbejdsmetoder, som kan tages i brug for at holde sig på sporet, når der skrives eksamensopgaver. Bogen henvender sig bredt til studerende, som går til eksamen i større skriftlige opgaver på videregående uddannelser, og dens budskab er, at studerende kan skrive sig ud af skrivekrisen. Genremæssigt er der tale om en log- eller notesbog, hvor den studerende guides gennem i alt 26 skriveøvelser, der kan laves med kuglepen eller blyant i bogen på dertil tænkte sider med fortrykte linjer, skemaer, punkter og lignende. Bogen giver altså et fysisk rum til alle de dokumenter, der laves undervejs i opgaveprocessen, men ikke direkte indgår i den færdige opgave. Den følger et opgaveskrivningsforløb fra start til slut. Ideen er således, at bogen er færdiglæst og -gjort, når arbejdet med én eksamensopgave er tilvejebragt.

Bogen er på 147 sider og falder i tre dele, der omsluttes af et indledende og afsluttende kapitel, hvor forfatternes skrivefilosofi og formål med bogen præsenteres. De tre dele gennemgår tre typer af skrivning, som forfatterne råder studerende til at skelne imellem og dyrke hver for sig: *tænkeskrivning, kladdeskrivning* og *færdigskrivning.* Hver af de tre dele struktureres vha. af redningskranse, både konkret ved at hvert kapitel i indholdsfortegnelsen og i bogen markeres vha. redningskransikoner, og i overført betydning ved at hver redningskrans introducerer et konkret og praktisk råd – en redning, der sikrer læseren en vej videre i opgaveprocessen.

Bogens første del introducerer syv redningskranse og 11 konkrete skriveøvelser. De syv råd inkluderer råd om at øve sig i og løbende anvende tænkeskrivning, at skrive i hånden og at undgå overspringshandlinger. Derudover fremhæves vigtigheden af udpege, afgrænse og undersøge faglige emner løbende i undervisningen og semesterlæsningen. Øvelserne i denne del spænder over klassiske procesøvelser som mindmap, freewriting på tid, skrivelogbog, notatteknik, kalenderplanlægning og huskelister over mindre arbejdsopgaver, der kan løses én for én. Der gives mange gode eksempler på situationer, hvor tænkeskrivning kan tages i brug for at undersøge og

reflektere over faglige emner, og så adresseres overspringshandlinger som et alvorligt problem, der kan overkommes vha. den præsenterede redskabskasse.

Den del, der gives mest plads i bogen, er anden del, der handler om kladdeskrivning. Med kladdeskrivning refereres der til arbejdet med at skrive individuelle kapitler, der skal indgå i en større opgave. Denne del består af i alt 26 redningskranse eller gode råd og i alt 15 skriveøvelser. Kapitlet introducerer en række opfindsomme og nye skriveøvelser, der skærper bevidstheden om kommunikationssituationen, de implicitte modtagere og afsenderjeget i skriftlige opgaver. Kapitlet indeholder desuden øvelser, der guider den studerende i at skrive ideudkast til skriftlige opgavers argumenter og strukturelementer; herunder indledning, problemformulering, redegørende afsnit, analyse, diskussion, konklusion og perspektivering. Forfatterne fremhæver kontinuerligt, at gode tekster er tekster, der er omskrevet mange gange, men ingen af øvelserne guider dog de studerende videre fra første udkast. Sidst i kapitlet foreslås seks øvelser, som kan anvendes, hvis man går i stå undervejs i kladdeskrivningen. Disse råd er konkrete og konstruktive og retter sig mod, at den studerende anvender tænkeskrivning og *permission slips*, zoomer ud, taler med andre om sine problemer og opsøger formativ feedback, samt lader sig inspirere af andre studerendes gode opgaver.

Tredje del, der omhandler færdigskrivning, er bogens absolut korteste del. Her præsenteres ni gode råd markeret som redningskranse. Til forskel fra de to andre dele, præsenterer forfatterne ingen øvelser i sidste del, men i stedet en række huskeråd og tjeklister samt instrukser om at printe opgaven ud og arbejde med den i papirform under slutrevisionen. Kapitlet udpeger en række centrale og vigtige elementer, som kræver opmærksomhed i færdigskrivningsfasen, herunder krav til formidling, argumentation, prioritering af plads, strukturering, positionering som fagperson og metakommunikation – dog uden dybereborende udredninger for de kvalitetskriterier, der knytter sig hertil. I kapitlet sammenfattes bogens løbende beskrivelser af opgavegenrens strukturelementer i et skema, der indeholder korte forklaringer som følgende: "Analyse: Du skal vise fagfæller, at du kan undersøge empiri ved hjælp af teori, begreber og metoder fra dit fag." (s.132). Kapitlet afsluttes med opfordringer til at anvende kilder korrekt, læse korrektur og slette overflødige elementer.

Bogens store styrke er, at de to forfattere tager afsæt i studerendes frustrationer, skriveblokader og mindreværd – og tager det alvorligt ved at anvise en konstruktiv vej videre. Der er intet spor af det letkøbte mærkat "dovne studerende." Forfatterne taler omsorgsfuldt og i øjenhøjde ved konsekvent gennem bogen at indskrive et *vi*, der refererer til forfatterne, og et læsende *du*. Bogen tager aldrig psykologens indgangsvinkel, men skrivepædagogens, idet der er fokus på at holde læseren skrivende og handlende. Dette betyder, at bogen er gennemsyret af imperativer: *skriv, red, læs, øv dig, lær, prøv, tegn* osv. Bagsiden ved dette valg er, at det at føle sig frustreret bliver en forudsætning for, at faktiske læser kan identificere sig selv som del af bogens

målgruppe.

Bogens sprog er ungdommeligt og ligefremt – og dermed langt fra et typisk akademisk sprog. Eksemplerne her er alle fra samme side i bogen og viser en generel tendens: *en lillebitte smule, bum, WTF, få galt i halsen* (s.72). Dette valg kunne være tematiseret i bogens indledning. Det samme gælder valget om ikke at anvende kildehenvisninger. Forfatterne anvender flere gange forskningsbaseret viden som belæg for påstande, men gør det uden at henvise til konkrete forskere og publikationer; se f.eks. s. 26 og s. 128. Bogen mangler desuden en litteraturliste. I det hele taget giver bogen ikke mange bud på kvalitetskriterier for akademisk skrivning – betegnelsen *akademisk* tages slet ikke i brug. Øvelserne er først og fremmest orienteret mod at skabe proces og arbejdsflow. Dette er en meget stor gevinst for læseren. Men samtidig repræsenterer denne orientering en begrænsning idet læseren ikke indføres i at afkode konkrete kriterier for akademisk tænkning og argumentation.

Skriv og skriv er en skatkiste af procesorienterede skriveøvelser for studerende, der oplever eksamensperioder med frie skriftlige opgaver som uoverskuelige. Styrken i bogen ligger i, at den anviser teknikker til at komme i gang med skrivningen og til at arbejde fokuseret i et kapitel uden at miste overblikket over opgaven i sin helhed. Godt i gang er som bekendt halvt fuldendt – hvilket på mange måder berettiger, at bogen stiller skarpt på opstart og proces fremfor på kvalitetskriterier og det færdige produkt.

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